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PUBLISHED MONTHLY BY EDISON ELECTRIC INSTITUTE

THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

JULY, 1943

	1943	1942	%
	SOURCE AND DISPOSAL OF ENERGY		
GENERATION* (Net)			
By Fuel Burning Plants	12,451,241,000	10,744,500,000	+15.9
By Water Power Plants	6,214,297,000	5,261,100,000	+18.1
Total Generation	**18,665,538,000**	**16,005,600,000**	**+16.6**
Add—Net Imports Over International Boundaries	154,185,000	111,000,000	+38.9
Less—Company Use	266,280,000	187,700,000	+41.9
Less—Energy Used by Producer	690,774,000	300,000,000	+130.3
Net Energy for Distribution	**17,862,669,000**	**15,628,900,000**	**+14.3**
Losses and Unaccounted for	2,450,527,000	2,462,970,000	− 0.5
Sales to Ultimate Customers	**15,412,142,000**	**13,165,930,000**	**+17.1**
	CLASSIFICATION OF SALES		
NUMBER OF CUSTOMERS—As of July 31st			
Residential or Domestic	26,814,972	26,439,594	+ 1.4
Rural (Distinct Rural Rates)	1,082,535	1,094,426	.....
Commercial or Industrial:			
Small Light and Power	4,156,755	4,287,708	− 3.0
Large Light and Power	146,676	148,973	
Other Customers	117,025	119,793	.....
Total Ultimate Customers	**32,317,963**	**32,090,494**	**+ 0.7**
KILOWATTHOUR SALES—During Month of July			
Residential or Domestic	2,232,722,000	2,053,351,000	+ 8.7
Rural (Distinct Rural Rates)	332,368,000	334,694,000	− 0.7
Commercial or Industrial:			
Small Light and Power	2,460,091,000	2,246,681,000	+ 9.5
Large Light and Power	8,849,177,000	7,470,565,000	+18.5
Street and Highway Lighting	143,174,000	137,187,000	+ 4.4
Other Public Authorities	750,931,000	332,734,000	+125.7
Railways and Railroads:			
Street and Interurban Railways	355,909,000	329,297,000	+ 8.1
Electrified Steam Railroads	208,828,000	192,428,000	+ 8.5
Interdepartmental	78,942,000	68,993,000	+14.4
Total to Ultimate Customers	**15,412,142,000**	**13,165,930,000**	**+17.1**
Revenue from Ultimate Customers	**$253,899,500**	**$232,460,300**	**+ 9.2**
AVERAGE CUSTOMER DATA—For the 12 Months Ended July 31st	**RESIDENTIAL OR DOMESTIC SERVICE (Revised Series)**		
Kilowatthours per Customer	1,050	1,011	+ 3.9
Average Annual Bill	$38.43	$37.31	+ 3.0
Revenue per Kilowatthour	3.66¢	3.69¢	− 0.8

*By courtesy of the Federal Power Commission.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume 11 OCTOBER, 1943 No. 10

Electric Industry Goes All-Out in Promoting Conservation Program

FULLEST cooperation by the electric light and power industry in promoting the voluntary seven-industry conservation program inaugurated Sept. 15 at the request of the Government is evidenced by a flood of exhibits of newspaper advertisements, news releases, radio scripts, display material, addresses and direct mail messages and other media for reaching customers and employees received by the Edison Electric Institute from companies throughout the country in response to a request for such material.

At the time of writing (before complete returns are in) exhibits have been received from companies supplying 21,000,000 customers, or 74 per cent of the number receiving electric service from the privately operated utilities, and veteran utility men who have seen the exhibits have expressed amazement at the thoroughness, completeness and extent of the industry's efforts to make the program a success.

* * *

As has been repeatedly emphasized the conservation program is, first, designed to conserve and release for war purposes critical resources—fuel, manpower, equipment, transportation facilities, communications, and materials such as copper, steel and tungsten; second, it is a cooperative operation between the Government, the seven industries affected, and their customers; third, it is a purely voluntary movement on the part of the industries, and in the case of the electric industry it is not dictated by a shortage of power.

The industries participating are the coal, petroleum, electric, natural and manufactured gas, water supply, communications and transportation and the program now under way is the outcome of discussions and meetings begun several months ago between representatives of the War Production Board, the Office of Defense Transportation, the Petroleum and the Solid Fuel Administrations, other government agencies, and representatives of the industries affected.

The need for and the objectives of the conservation program have been stated in a joint message to the American people from Secretary of the Interior Harold L. Ickes, Defense Transportation Director Joseph B. Eastman and War Production Chairman Donald M. Nelson, in which they said:

"Conservation of fuel, manpower, equipment and materials is a 'must' for the United States if we are to achieve the maximum war production every American wants.

"Every pound of coal, every gallon of oil, every cubic foot of gas that can be saved means that our national energy pool is strengthened just that much. Every man-hour saved in the production of these basic fuels, in the production of electricity, in transportation and in communications is a man-hour that can be used for something else. Every pound of tungsten that is saved in the production of electric lamps is a pound that can be used in the production of radar equipment.

"These savings and the countless others that will result from a broad conservation campaign may appear small in the average household or the average industrial or commercial plant. Multiplied by millions of homes and thousands of factories and stores, however, they are tremendous. The saving of a single ton of coal next winter by one householder will not win the war. But if 18 million householders do it their combined effort will go a long way toward winning the war. The same thing applies with equal or even greater force to each of the other industries represented.

"We have, therefore, called upon the coal, petroleum, electric, natural and manufactured gas, water, communications and transportation industries to join with us in a broad conservation campaign to accomplish these results. The campaign will be voluntary. Cooperation of these industries in asking the public to use their services only as absolutely necessarv represents a real sacrifice by them. We ask the American public to appreciate that sacrifice and to give them and the war effort enthusiastic and unstinting cooperation as this campaign develops.

"In the electric utility industry the installed generating capacity, together with capacity now under construction, is ample to meet all foreseeable electric needs. It is essential, however, to save the use of electricity wherever possible so as to reduce directly or indirectly the demands for materials, fuel, transportation and manpower. The desired result will be obtained through the full cooperation of millions of people in the conservation program. With everyone contributing the effect will be tremendous in hastening the day of Victory." — J. A. KRUG, *Director of Office of War Utilities of U. S. War Production Board.*

The overall plans for the electric utilities' participation in the program were prepared by a special task group at the request and under the sponsorship of the Office of War Utilities, War Production Board, and were then approved by an informal electric advisory committee and J. A. Krug, Director of the OWU. The special task committee consisted of: William A. Lyons, chairman of special task committee and chief of the fuel and allocations branch of the Office of War Utilities, War Production Board; H. C. Blackwell, president, Cincinnati Gas and Electric Company; Charles A. Collier, vice-president of Georgia Power Company; C. W. Kellogg, president, Edison Electric Institute; Arthur Goldschmidt,

acting director, Division of Power. U. S. Department of Interior; Carl H. Reker, Ebasco Services Inc.; R. E. Moody, vice-president, Union Electric Company of Missouri; Herman Russell, president, Rochester Gas and Electric Corporation; Walter Seymour, director, Department of Power Utilization Tennessee Valley Authority; E. F. Scattergood, advisory engineer, City of Los Angeles, Department of Water and Power, Bureau of Power and Light; H. P. Sedwick, vice-president, Public Service Company of Northern Illinois, and Philip Sporn, vice-president, American Gas and Electric Service Corporation.

Emphasis has been placed on the fact that each saving, no matter how small, helps, especially if each customer contributes to the saving.

* * *

In implementing the program the electric industry is asking its customers to save electricity voluntarily as follows:

Commercial customers (stores, offices, small businesses) are asked to conserve on the use of and, in some cases, to eliminate indoor and outdoor electrical advertising, promotional and display sign lighting, decorative and ornamental lighting, decorative flood lighting, show window lighting, lighting of marquees, lighting of outdoor business establishments, non-essential interior and show case lighting, air-conditioning. Careful use of all lights and appliances is recommended.

Householders are asked to turn off unnecessary lights, to turn off their radios unless some one is actually listening to a specific program, to guard against overloading their refrigerators, to cook as much as possible on the low heat units of their electric ranges, and to exercise other practical ways of saving electricity around the house which can be done without undue hardship.

Industrial customers are asked to look through their plants to check any waste of light, due to dirty shades or other causes, to check on the use of motor and heating equipment, and to make sure that all electric equipment is given extra care.

The industry, however, is pointing out some services which should not be conserved, because of inherent danger, in so doing, to either war production, human life or property. Examples of these are lighting essentials to public health, to eyesight conservation, to safety, to plant protection, to transportation, to war production, to military purposes, to aviation, to police protection, and to morale-building oudoor recreational activities.

* * *

As a participant in the seven-industry Conservation Program the electric industry is in what, by ordinary standards, would be a paradoxical position in that there is no power shortage, present or in sight, and in that it will inevitably suffer an appreciable cut in revenue as a result of its cooperation in the program. This unique situation was emphasized by the New York *Herald-Tribune* in a recent article which began with the statement that "The electric light and power industry presented to the nation last week the unusual spectacle of a business which has the facilities to meet any anticipated demand for its product but is nevertheless asking the public to curtail its use of energy in order to conserve materials, fuel, transportation and manpower for the war effort."

No time limit has been placed on the conservation program and its active promotion, and it will undoubtedly continue as long as the government deems it necessary. Government officials and industry executives are certain that it will be effective although its final results can only be measured by the extent of the consumers' patriotic response to the pleas for conservation.

* * *

In the meantime, it is evident that the cooperation of the electric industry extends far beyond perfunctory compliance with the government's request to publicize the program, as shown by detailed reports and logs of company activities, and by the tone and context of the messages to the public and to employees.

Practically all media and channels of publicity are being utilized in publicizing the program. They include in addition to intensive newspaper advertising, radio, direct mail, bill stuffers, car cards, indoor and outdoor posters, show windows, etc., such activities as personal contacts with municipal authorities, local civic and business organizations such as Chambers of Commerce, Rotary, Kiwanis and other clubs. Education of employees in the mechanics and objectives of the campaign, and their personal contacts with customers is also an important part of the program. Civic and trade groups are contributing notably by their cooperation with the utilities and are using energetically their special mediums of publicity in promoting the campaign.

The following condensed log of activities of a middle western utility in inaugurating the program may be taken as a typical example of how the program is being implemented locally:

ELECTRICAL CONSERVATION PROGRAM

Log of Activities—Covers Three Weeks

9/3/43 Called together representatives—one from each of seven industries—to form local inter-industry task committee. Officers were elected. Date was set for public meeting on Sept. 8.

9/4/43 Publicity in local press on inter-industry organization and objectives.

9/8/43 Called together 15 heads of principal city groups to form ——— Electrical Conservation Task Committee. Represented were Board of Education, City Hall, Manufacturers Association, Retailers, Wholesalers, Grocers, Building Owners, Hotels, Hospitals, Theatres, Three Community Merchants Groups, Sign Companies, Outdoor Advertising Companies, and the Electric utility.

Printed sheets of the National Electrical Conservation schedule were distributed. Full cooperation was voiced by all.

A general conservation meeting was attended by approximately 60. All programs except transportation were presented and explained by their respective representatives; printed electrical conservation sheets were distributed.

9/9/43 Story on both Electrical conservation committee meeting and General Conservation public meeting carried in local newspaper.

9/11/43 The Power company started including brownout propaganda in series of six radio broadcasts over all four local stations, directed chiefly to residence users extending over a period of eight days.

9/12/43 Sunday paper carried brownout story.

9/13/43 Power company mailed 11,000 copies of "War Time Electric Service News" to all commercial and industrial customers. Entire issue devoted to the general conservation and electrical conservation programs. Complete electrical conservation schedule carried in the center spread.

9/14/43 to 9/18/43 Brownout story carried in eight weeklies (suburban, foreign language, etc.)

9/15/43 Associated Retailers directors voted full approval of the National Electrical Conservation program and set the hours 7 to 9 P. M. as time for win-

dows and signs to be lighted. Sent communications to all members requesting compliance.

The local newspaper carried top center front page story on brownout. All four radio stations carried the story on their news periods. One radio station carried an up to the minute release in their 10 P. M. newscast to the effect that the larger stores were observing the brownout, but that many of the smaller establishments apparently overlooked it.

9/16/43 Newspapers carried story and photographs, with headline, "Downtown adopts Brownout slowly," with theme that larger stores had complied but many smaller ones had not as yet.

9/18/43 Newspaper carried good editorial regretting lack of 100 per cent compliance reminding of importance of success of voluntary rather than mandatory program.

9/21/43 City Council passed resolution ordering out of service one-half of downtown street lights. Local paper carried front page item on this.

9/24/43 Mayor issued proclamation asking all citizens and business concerns to join in the conservation of electricity in compliance with the national program. Press gave this front page space.

* * *

The spirit of cooperation in the program seems to be well expressed in a letter from the President of a New England company to his employees. It reads in part:

> Fellow Employees:
>
> Because we make and sell electricity our Company and each of us individually is a part of the Program. Because coal is the fuel from which we make electricity in our generating stations, we will save coal and also transportation and manpower by conserving the use of electricity here in the office and in our homes.
>
> In your work, when you are indoors, please don't use the lights unless they are really necessary. This doesn't mean you should work in the dark, consequently strain your eyes and thus lose efficiency, but it does mean that at certain times of day you may not need any artificial lighting at all. It does mean for you to turn out the lights when you leave the room and nobody else needs them.
>
> In other words, the practice of good old Yankee thrift here and in your home will accomplish all that can reasonably be expected. Our own advertising for the next few weeks will have definite messages for our customers and we hope that you will take time to read them and call them to the attention of your families and neighbors.
>
> Remember there is no shortage of electricity in our Company but we save coal by cutting out non-essential uses. A good slogan to have in mind is "Use the electricity you need, *but be sure* you need what you use."

Public Utilities Supply Two-Thirds of All Industrial Power

THE adjoining table, based upon Tables 9 and 10 of the article "Electric Power and the War" in the September issue of the Survey of Current Business (U. S. Dept. of Commerce) shows the use of electricity by the various industrial and mining groups in recent years. The total of 135,763,000,000 kwhr used in 1942 compares with the estimate of 156 billions made by Dr. Marlio* in his report last year to the Brookings Institution, predicting a power shortage. In 1942, public utilities supplied 64.3 per cent of all power in industry.

"The Federal Power Commission," says the Survey of Current Business, "in analyzing industrial demands for electric power, has found that our industries have, in the aggregate, used less electric energy per manhour in 1941 and 1942 than in 1940. (In 1942 the figure was 4.55 kwhr per manhour; in 1941 it was 4.75 and in 1940 it was 4.99.) This surprising result was chiefly due to the fact that, since the national defense program got under way, far more workers have gone into factories where materials are processed into finished products than into establishments producing raw materials. Employment in manufacturing has expanded 50% from 1939 to 1942, while in the extractive industries it rose only 10%. Since the production of raw materials requires more electric energy per manhour than is required in processing, the national average consumption of power per worker per hour has dropped slightly."

* Dr. Louis Marlio, in his study "Will Electric Power be a Bottleneck?" published last year by the Brookings Institution, based his forecasts of an impending power shortage largely upon a figure of 6 kwhr per manhour. In this he stated that "we believe we are extremely conservative" (p. 57). If he had used 4.55 kwhr he could have forecast the 1942 use of power exactly.

Electric Power Consumed by Various Industrial Groups

Classification	(millions of kilowatt-hours) 1939	1940	1941	1942
Iron and steel and their products	12,399	14,983	19,044	21,596
Chemicals and allied products	9,335	11,871	15,076	19,075
Non-ferrous metals and products	6,432	8,331	11,505	17,501
Paper and allied products	9,394	10,362	11,581	11,917
Textile-mill products	6,805	7,363	9,064	9,600
Transportation equipment (incl planes, tanks)	3,036	3,926	5,426	7,662
Food and kindred products	6,562	6,657	7,478	7,681
Stone clay and glass products	4,852	5,359	6,587	6,804
Machinery, except electrical	1,985	2,529	3,576	4,565
Products of petroleum and coal	3,440	3,815	4,318	4,571
Electrical machinery	1,432	1,817	2,508	2,943
Rubber products	1,584	1,652	2,046	1,730
Lumber and basic timber products	1,238	1,364	1,524	1,555
Printing and publishing	859	914	983	943
Furniture and finished lumber products	605	685	810	820
Apparel and other finished products	353	375	447	478
Leather and leather products	402	407	494	502
Tobacco manufactures	115	125	138	139
Miscellaneous small industries, total	527	587	735	796
Total Manufacturing	71,355	83,122	103,340	121,268
Coal mining	3,529	3,988	4,282	4,551
Metallic ores mining	2,922	3,348	3,790	4,224
Crude petroleum, nat. gas and pumping	1,236	1,364	1,364	1,314
Other mining and quarrying	810	919	1,153	1,247
Total Extractive Industries	8,497	9,619	10,589	11,336
All other industries*	1,594	1,764	2,203	3,159
Total Industrial Power Consumption	81,446	94,505	116,132	135,763
Of which:				
Generated by industries themselves	32,900	38,200	43,000	47,500
Imported from Canada by industries	864	1,176	1,373	952
Balance: Purchased from Utilities	47,682	55,129	71,759	87,311
% of Total Consumption	58.5%	58.3%	61.8%	64.3%

* Car shops, cotton-gins; government arsenals and shipyards, motion pictures and other industries not covered by the U S Census.

* * * * * * * *

I AM CAPITAL

By Benjamin DeCasseres

In the New York Journal-American

I am capital.

From me come the words *capitalist* and *capitalism*.

My name is used by totalitarian reactionaries, New Deal pinks, soapbox Reds, demagogic and vacuous college professors, vodka-saturated "economist" and cream-puff-brain idealists to scare *you* and *you* and *you*.

However, I *capital*, now come to tell you who I am and some of the things I have done.

Well, first of all, I'm in the dictionary. What does Webster say about me? This:

"CAPITAL: The amount of property owned by an individual or corporation at a specified time. The amount of such property which is used for business purposes. An aggregation of economic goods used to promote the production of other goods instead of being valuable solely for purposes of immediate employment. The total amount of such goods in continuous existence."

So much for the dictionary definition of myself.

* * *

Adam Smith was the greatest of all writers on economics because he saw the human race and the laws of life as *they are* and not as a product of his wishbone. He said about me that *"capital is that part of a man's stock which he expects to afford him revenue."*

Therefore, I am business and individual *surplus*, surplus of anything—money, energy, merchandise, brains, property.

The capitalistic system is based on these surplus values.

Without these values life could not be carried on for another day.

I, *capital*, am SURPLUS.

Every one, therefore, is a capitalist who has capital of any kind—that is, anything above and beyond his hand-to-mouth living.

The money you did not spend this week out of your wages is *capital*.

* * *

I *capital*, am the food on your shelves and in your iceboxes.

I am your insurance policy.

I am your two extra suits of clothes and shoes.

I am the goods on your store-shelves.

I am a corporation's surplus for next year's expansion.

I am the million dollars your labor union is not using.

I am your investments—in bonds, real estate, stocks.

I am your war saving stamps.

I am the money you are putting away for a rainy day.

I, capital, am the lever of all progress—for I am *surplus* to be used for upbuilding and adventure.

I am that extra wealth that lifts man above the brute and the bare necessities of existence.

I, *capital*, not only built America but I have raised out of the mire and mud every people on earth.

Without me, *capital*, there can be no production of *any kind*.

* * *

Without me, *capital*, there would be no leisure, no books, no art, no music—all of which represent *surplus* value.

I, *capital*, am not *equality*, for there is no such thing.

I promote inequality, competition, rivalry, competence.

I have, I admit, the imperfections and am subject to the abuses of all things human.

But I have distributed a thousand benefits to the human race to one act of malevolence.

You may collectivize me and call me Communism or Fascism. But I am still *capital*—SURPLUS value.

You may individualize me, as in England and the United States—I am still *capital*.

You may "socialize" me. But I am still *capital*.

I flourish best and produce the finest results for mankind in those countries where I am free and individualized, for individualization is the *law of life*.

I work for the "common good" like all things in this world—that is, through the *individual*.

Americans, you will change my status at your peril, for the genius of your character is *individualism*.

I have brought you to the greatest political, economic, and physical height that any nation in history has attained.

If you desert me for my lower forms you will sink to the levels of those forms—the collectivist-capital forms of Russia and Germany.

I am *capital*. I am property, and I cannot be separated from liberty, for both liberty and property are one—they are the *capital values* of spirit and body.

An Industry Speaks Up!

Advertisements appearing in recent months in this newspaper over the signature of our local Kansas Electric Power Company tell a vivid story of the electric industry under war time conditions. Similar copy is carried by many other publications throughout the country, for it is an industry story not that of a single company. The advertising is sponsored nationally by more than a hundred electric companies doing business under the American system of business management.

And the story should be told! Perhaps no industry in America has been so severely lashed by the New Dealers during these past ten years as has the power industry. Government ownership advocates have made the headlines for a long time, and unfortunately too much federal money has already been poured into competitive power projects, swelling the ever-increasing national debt. The industry, under business management, has a right to tell its story to a listening public.

While electricity itself performs many feats bordering on the miraculous, yet there is no particular mystery about the operation of the industry which produces it. The problems of the business-managed companies which produce more than 80 per cent of the nation's power are little different than those faced by the rest of us. They have regulation and demands for reports under the many federal bureaus, except that they have more of them and have been at it longer. They have increased costs of materials and labor. They are faced with restrictions on expansion. They too are faced with shortages of skilled help and critical materials for maintenance. Increasing taxes have been imposed upon them to where, at present, 23 cents of every dollar received goes to local, state and federal taxes.

But in spite of these problems and increased costs, rates for electricity continue at pre-war levels and these are now, on the average one half what they were 15 years ago. This fact, coupled with the outstanding job the industry is doing in maintaining an adequate and dependable supply of power for war industry and normal needs, is ample evidence of the value of business management in this and every other industry. The electric power people have not only a right, they have an obligation to tell their story to the public.—Editorial in the *Leavenworth* (Kansas) *Times*.

Effects of Maturity on the Electric Industry

By C. W. Kellogg
President, Edison Electric Institute

ON account of the stress of the war, the sixtieth anniversary last year of the birth of the electric industry was passed by without any attempt at formal recognition of the occasion. With the rapidity of progress in all economic lines based on science and engineering during those sixty years, new industries have tended to grow to maturity perhaps more quickly in the period now ended than was the case in earlier and more leisurely periods. It may be of interest to consider some of the effects of maturity in general and to apply them to the Electric Light and Power Industry.

The most obvious effect of maturity is a change in the percentage rate of growth from year to year. As a very simple example, let us consider an industry that starts with annual gross revenues of $1,000,000 and then for forty years shows an average annual gain in gross revenue of $731,000. Of course, no typical industry would grow by equal increments each year for forty years; even aside from variations in business activity the more usual rate of progress being like the hysteresis cure, slow starting, fast in the middle and slower at the end. For our purposes, however, of comparing the first and last year of the forty years of growth, the exact basis of change in the intervening years is not of primary importance.

The figures I have chosen for my example may seem queer at first glance, but they happen to be exactly in proportion to the years 1902 and 1942 for the electric light and power industry, whose combined gross revenues in the latter years were somewhat more than twenty-nine times what they were forty years earlier. On the assumption I have made of uniform growth, the first year would show 73 per cent gain over its predecessor, while for the last year the rate of growth becomes about 2½ per cent. Regardless of the variations from uniformity in annual growth which in practice would inevitably occur, it is clear that the very size, built up over a long period, tends at the end to reduce radically the size of percentage changes from year to year, compared to what they would be in earlier years.

A classical example of the steadily declining rate of growth with increase in total size is that of pig iron. From 1880 to 1920 this industry grew from an annual production of 2,355,000 tons to 36,926,000 or about fifteen times. In the decade from 1880 to 1890 the average rate of growth, allowing for the fat and lean years, was 133 per cent, followed by 93 per cent in the second, and 78 per cent in the third decade, with the fourth decade, from 1910 to 1920, showing an increase of only 38 per cent.

One of the logical effects of this development over a considerable period is to change the emphasis on the various activities of the organization. In the earlier period the greatest efforts would have to be exerted in building up organization and plant. In the later period, while development and plant extension would both continue, they would come gradually to form a smaller part of the total effort and emphasis would tend to be upon the most efficient and effective functioning of the great machine that had been built up through the years. Anyone who has been a part of the utility industry through the last forty years can realize from his own experience that this gradual change in emphasis has in fact followed the cycle indicated by our simple figures.

Coming now more specifically to our own industry, we know that there are certain percentage ratios of a very fundamental character affecting electric utilities which change hardly at all with growth in total size. One of these is the necessity of expending say $5 for new plant for each $1 increase in annual gross revenue; the other is the need of setting aside for depreciation, amortization of debt discount and surplus by way of dividend stabilization, of a sum which bears a fairly constant ratio to gross revenue—say, roughly 15 per cent. The combination of these relatively fixed percentage ratios with the automatically decreasing growth ratios, produces at the end of forty years some striking changes in overall results.

In the example we have chosen and the conditions we have assumed, the first year's growth in earnings would require the expenditure for construction (at $5 per $1) of $3,655,000. For this purpose there would be available from current funds only 15 per cent of the first year's gross revenue of $1,000,000, or $150,000. This would care for only a trifling part of the funds needed. All of the remainder (or nearly 96 per cent) of the construction requirements for that first year would have to be raised by the sale of securities. Passing now to the end of forty years, and assuming, as we have, that the same amount of construction funds would have to be raised in that last year, we have at the end of the period, from the 15 per cent of gross revenues alone, well over $4,200,000, thus being able to finance that year's growth entirely from current funds, where in the first year but 4 per cent of construction requirements could be so raised.

As has already been stated, growth from infancy to maturity does not usually occur along a straight arithmetical line. It is interesting to note, however, that the financial history of the electric utilities during the last half of the forty-year period now ending tends at least to approximate the sort of development which our simple example would lead one to expect. During the six years 1925 to 1930, both inclusive, near the beginning of that last half, an analysis of approximately three billion dollars raised in that period for construction purposes by utility groups representing two-thirds of the industry, showed that they came from the following sources:*

From current funds (Reserves or undistributed net earnings)	26%
From the sale of securities (including a total of 35% from common stocks)	74%

In the most recent period, however, the eight years ending with 1942, during which the entire electric utility industry raised for construction the total of $3¼ billion, the sources of these funds in this recent period were:

From current funds	82%
From sale of securities (common stock alone 1%)	18%

Finally, for the current year 1943, estimated construction budgets of electric utility companies aggregate $282,000,000, which is about 10 per cent of current gross revenues. If the budget

* Present Day Financing for Utilities, by C. W. Kellogg, E. E. I. BULLETIN, June, 1936.

estimates for this year are not exceeded, therefore, it would seem likely that, on the average, no sale of securities by electric utilities will be required to raise construction funds this year. This being our average result for all companies, it is, of course, to be expected that some individual utility companies may still have to sell securities to raise capital this year.

It is important to observe how the maturity condition which is the subject of this discussion has operated with respect to equity investments in the recent period. Since the inauguration under the Holding Company Act of 1935 of Federal regulation adverse to utility equities, combined with the entry of the Federal Government in certain areas as a heavily subsidized competitor of the utility companies, common stocks of such companies have become almost unsaleable. The record shows that from 1935 to 1942, both inclusive, only 1 per cent of the total $3¼ billion of construction funds raised during that period was from the sale of common stocks. Yet during this same period the Securities and Exchange Commission has insisted upon the maintenance of adequate equity margins with respect to the various bond issues they have approved from time to time for issue by utility companies.

Under the conditions existing in the early years of the industry, the combination of (1) the need for billions for construction, (2) the necessity for maintaining adequate equity covering for bond issues and (3) the unsaleability of common stocks would have resulted (if applied to the recent period) in complete disruption of utility service, due to inability adequately to finance the cost of extensions. Yet this did not occur; all construction needs were met in full. How was this managed? As I have just shown, 82 per cent of the huge total for the years 1935 to 1942, inclusive, was raised from current funds. And with respect to the remaining 18 per cent (only one-eighteenth of which came from the sale of common stock) the maintenance of the equity margin for bond issues was affected in many cases by serial bank loans running from five to seven years. These latter represent, of course, in effect, a call on future earnings; indeed, the banks would not have been justified in making these serial loans but for the belief that they could be liquidated from current receipts. This confidence by the banks is further evidence of the present strength of the utilities' current position.

If, therefore, our analysis is sound, the conditions arising from the maturity of the electric utility business are the one thing that has enabled it to continue adequately to perform its service duties to the public during these last eight trying years.

Lest I be misunderstood, let me say most emphatically that maturity for the utilities does not mean either saturation or stagnation. In the case of a man, maturity means that the efforts to get an education and a start in life are behind him and that the best productive years of his life are ahead. In the case of our industry the years, when credit was limited and yet demands for new capital were apparently unlimited, are behind us; and our current financial resources will largely carry us through normal times. Surely the outstanding performance of the electric utility industry in meeting in full the unprecedented demands of the greatest war of all time is the performance of a very alive and virile industry.

Nor is a great industry like our own circumscribed as is an individual by waning physical and mental powers. Men may come and men may go, but the great tide of electric energy for the people goes on, ever new each instant and each decade. The present magnitude of the electric service we furnish would have been undreamed of by the courageous pioneers who organized the business many years ago and carried it through its early and most difficult years. Obviously the vast majority of those now carrying on our great service were not even born sixty years ago; but each year new, capable hands, guided by well-trained brains, come forward to carry the torch their predecessors were forced to relinquish.

Another great benefit from maturity is the whole body of traditions of service ideals and standards, built up through the years by the thousands of men in the industry who have devoted their best powers of head, heart and hand to the continual improvement in quality and diffusion among the people of the electric service, to which all our efforts are dedicated. These traditions, constructed of loyalty to the service (even to the point of sacrificing life itself) and of building up the friendship and confidence of our many millions of customers, have created an asset of incalculable value both to the companies and to the public served. Being the cumulative effect of many years, they can be counted as a priceless by-product of maturity. As one of the greatest of our elder statesmen, P. S. Arkwright, recently remarked:

> "Our customers, when all is said and done, are the only real asset we have."

And again,

> "If we make ourselves truly useful to the public, I am not worried that the public will desert us. The best safeguard against having our business taken away from us is to make the public so well pleased with our service that they will not want anybody else to serve them but us."

Perhaps the best refutation of the suggestion that for the electric utilities maturity connotes saturation is the attitude of the industry itself. Probably most of the members of the utility organizations would be surprised at the very suggestion that the industry has reached maturity. I think the reason for this is that the rapid and relatively steady growth of the electric business has not been a haphazard process or one allowed to take its course. On the contrary, it has, for as long as any of us can remember, been actively and planfully promoted by well-organized commercial activity. Perhaps this statement can be most effectively supported by the fact that during the last sixteen years, half of which were a depression period, the number of electric customers grew nearly four times as fast as the population from which they were drawn. The only thing that has caused some diminution of commercial work since the war began has been the lack of apparatus to sell to customers and the lack of materials to extend our lines to them. The policy of helpfulness to customers and maintaining the goodwill of maturity continues through the war. The cessation of hostilities will be the signal for the renewal of commercial work by the utilities with all the vigor of youth and the poise and assurance of maturity.

If my analysis of the effects of maturity is well founded, I think we can feel that all the effects are good; that they make for greater stability, better service, more satisfied customers. I believe we can feel also that, in achieving the satisfactions of maturity, we have done so without losing any of the active virtues of youth—vision, energy and enthusiasm.

The Post-War Demand for Power

Long-Range Expansion Is Assured

By M. L. Sindeband

Vice-President, The Ogden Corporation

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THE World War now raging around the globe not only has caused an immediate sharp increase in the consumption of electric power, but has given rise to scientific and industrial developments that will accelerate the expansion in electricity demand during the era that will follow the transition back to a peacetime economy.

When we look at the post-war prospects for consumption of electricity we must recognize that a readjustment will occur when war industries close down and the nation demobilizes. With the end of hostilities the utilities will be confronted with a drop in war production kilowatt hours for a period of say eight months to a year—a period of conversion to peacetime production. Sales for commercial and residential use may rise sharply, particularly in areas where such consumption has been curtailed by dimouts and other wartime measures.

But with reconversion completed, the true post-war era will begin. At that time, the scientific and technical advances that are being hastened under pressure of war will produce their fruit in the shape of increased production of better goods and services at lower unit costs.

It has been pointed out that, in the wartime emergency, technical advances in industry that would ordinarily have taken many years, have been compressed into a matter of months. Many of these advances bear directly upon consumption of electricity. Many of these call for large amounts of electric power to produce raw materials, to manufacture finished products and to operate new appliances in industry and in the home.

Industrial Demands

The industrial power load has been greatly increased by the war. In the course of the next decade, there is every reason to believe, the present record industrial load will not only be equalled, but largely surpassed.

It is evident that the war has imparted a tremendous impetus to research in many industrial fields. This is particularly true in the fields of aviation, metallurgy, plastics and synthetics. We know more about electronics than ever before. The idea largely prevails that electronic devices are limited entirely to the field of communications. This is not true. Many industries are finding practical applications for electronic devices.

The successful application of electronics in the use of high frequency heating of pinned strip will stimulate greater use of high frequency power in the metal working industries, for example.

The development of long distance transmission of power by direct current will depend on advances in electronics, too. Further tube improvements in other industries will advance the art to the point where high voltage tubes would be available for long distance transmission.

There are three great groups of newer raw materials, the production of which will call for large amounts of electric power. These are:

1. Metals. The rise of aviation to a position of leadership in the field of transportation and the growing emphasis upon lightness in a wide variety of durable goods will vastly expand the uses of aluminum and magnesium. The increased production of these metals involves a greater power load.

The development of new industries after the war and the technological changes in manufacture as well as transportation should mean a heavy demand for the older metals such as steel and for the many new varieties of steel which are being developed under the stress of wartime needs.

In the railroad industry, for example, increased speeds of passenger and freight trains will require heavier rails, longer curves and turnouts and greater banking of curves. All these spell greater demand for old and new types of steel.

In the construction of new freight and passenger equipment there will be wider application of rust and corrosion resisting steels. And, as a study by United States Steel Corporation points out, the higher speed of trains will favor increased use of rolled steel wheels and hollow axles. The study also points out the need for some 1,500,000 dwelling units in the first ten years after the war. The backed up demand for passenger cars and trucks will provide a need for some 12,000,000 automotive vehicles by the end of 1944—which, of course, will require heavy volumes of steel. All this requires power.

2. Plastics. The consumption of plastic materials today is larger than ever before, although most of the output is devoted to war uses. The manufacture of plastics on a greatly expanded scale will make for a corresponding increase in electricity consumption by the chemical industry.

3. Synthetics. The rayon industry was already firmly established before the war. A host of new fibers and synthetic materials will become commonplace when the war is over. Synthetic rubber, for example, will take the place of the imported natural product in many uses. If we are to make a large part of our rubber in factories in this country, rather than buy it from plantations in the East Indies, a large amount of electric power will be required to make it.

Industrial Processes

Many industrial processes requiring large amounts of electric power are being perfected during the war period. The miracles of electronics provide a particularly striking example of these.

The public has learned in recent months about radar, and how our armed forces can ferret out the location of enemy planes, ships and submarines with electronic equipment. But numerous electronic devices will make their appearance in industry at the end of the war.

One such use is the "case hardening" of metals, so that the quality of hardness is obtained by high frequency heating of the outer layer without imparting the brittleness that comes from hardening of the entire thickness of the metal. High frequency induction heating is also applicable to the brazing, soldering and annealing of metals, and the treatment

of textiles, wooden materials, plywood and plastics.

Much has been written about the significant roles that plastics will play in the materials picture after the war. Relatively little has been generally published about the technical development of high frequency heating of plastics as a means of swiftly bringing a plastic material to a temperature at which it possesses sufficient fluidity for the desired flow.

High frequency heating of plastics as a means of forming and molding plastics is receiving increasing attention and is bound to require a growing volume of electric power in the fabrication of plastic products.

The use of electricity in this connection is described as the Heatronic process. One of its major contributions to the art of fabricating plastics is increased speed in forming the product. Plastics materials have been welcomed for many industrial uses because of the relatively quick time it takes to form them. Speed in molding is of utmost importance and has received considerable study. The use of electricity, which shortens the forming period, undoubtedly will be broadened as rapidly as restrictions on equipment construction are lifted and high frequency heating units can be built in greater numbers.

Industrial Production

The industrial power load will be increased not only by these new uses, but also by the high level of production that is anticipated in the era that will follow the postwar transition period. Assuming that industry will provide reasonably full employment once reconversion has been completed, the volume of industrial production would rise to levels comparable with those now prevailing during the war. This will call for the continuous consumption of electricity on a scale like the present. Whereas emergency measures are now adopted by the public utilities to fill the swollen wartime power demands, after the war it will be necessary to provide added facilities to make possible sustained power production at the present level.

How can peacetime industry maintain a level of production equal to that of a war period, when the Government is the chief buyer for manufacturing output? The rise in living standards, a building boom, a high level of export trade and advances in transportation could produce such a condition within the coming decade.

For one thing there will be a vast reservoir of purchasing power in the hands of American consumers. The Department of Commerce, in its study of Markets After the War estimates that if the war should last through 1944, the total savings for three years might exceed 100 billion dollars as against a normal tendency to save no more than half that amount. This volume of purchasing power is bound to be used to satisfy deferred needs, including home building and purchases of the many things that were not available to consumers during the war.

Residential Consumption

Since electricity is now a necessity and an integral part of the American way of life it is fair to assume that the home of the post-war world will be an electrical home.

So the sharpest gains in electric power consumption loom up in the field of residential consumption. Here a number of factors place the industry on the threshold of a great expansion in the demands to be made upon it. These include:

1. The greatly expanded purchasing power of the American people. Official estimates are that purchasing power will have been increased by upwards of $50,000,000,000 during the war, through increases in cash and bank deposits owned by individuals and purchases of war savings bonds that can be turned into cash on demand. These funds will be used in large part to acquire consumer goods during the post-war period when they will once more be freely available, assuring a very high rate of installation of electrical appliances.

2. A great building boom is widely expected to develop within a few years after the end of the war, as happened at the end of the last war. The homes of the future will be equipped with electrical appliances to an extent never equalled before. Already, pre-fabricated homes with built-in air conditioning and other appliances are designed, ready for marketing at the end of the war.

3. Electronic development opens the way for television and other home appliances consuming large amounts of electricity.

4. Air conditioning in and of itself will consume a huge power load, both for residential and commercial use. All the warmer parts of the country, and in summer the northern cities as well, will constitute vast markets for air conditioning equipment, and for the power required to operate it.

When we compare the per capita consumption of electricity for residential use in homes well equipped with electrical devices with the present average for the nation, the extent of the rise in the residential load that may occur becomes clear. When newer electrical appliances and household equipment have been installed, the extent of the rise is greatly extended. A well-equipped home today consumes about 1,000 kwhr a year. Three years after the end of the war the average could well rise to 1,200 kwhr for a new home, air-conditioned and equipped with up-to-date appliances.

The Agricultural Load

Increased rural demand for electricity should also swell the demand for post-war electric power.

Post-war farming is expected to be more mechanized, utilizing a great deal of power equipment. To a greater extent than ever, the farm will be called on to produce more than food. It will be called on to provide the many agricultural products required for synthetic raw materials which will become essential to many industries. The farmer of the future may even process some of his own raw materials at the source.

The better farms of this country already have electric service, but there is room for substantial increased demand. The program of country-wide rural electrification which had gathered considerable momentum prior to our entrance into the war undoubtedly will be resumed after the war.

War needs for critical materials virtually halted growth here. Future possibilities in this field are suggested by the fact that only 40.8 per cent, or about 2,500,000 of the nation's farms are electrified. Almost 1,000,000 farms which are not electrified are located within a quarter mile of distribution lines, thus simplifying the task of additional development.

To sum up then, the scientific and industrial developments born of the war, the rise in living standards and the deferred construction of homes should broaden the use of electric power when we enter the post-war era that follows the transition from war to peace.

Large amounts of electric power will be required in the production of light metals used in aviation and other industries. New markets for older metals such as steel will also require a high

(*Continued on page* 312)

Never a Dull Moment with Lengthened Schedules and Reduced Manpower

A Case History of One Department in a Middle Western Utility

By K. E. Boyle
Dayton Power & Light Company

THE Dayton Power Light Company can be classed as a medium size utility. We serve about 3300 square miles of territory and some nineteen counties in southwestern Ohio, the general center of which is Dayton. We have service in about 200 communities and the adjacent rural territory. Dayton, of course, is the largest city we serve. We have gas and electric service primarily, some water, some steam and some hot water heating. We have a total of 220,000 meters—about 98,000 gas, 120,000 electric, 1500 water, 500 steam and 200 hot water heating, representing some 144,000 customers.

On January 4, 1941 we had approximately 1500 employees and on March 27, this year, 1116, a reduction of about 23%. Such reduction occurred primarily in the operating departments, due to curtailment in construction work, some curtailment in maintenance and service work, etc. During the period from January 1, 1941 to March 27, 1943 out of the normal complement of 1500 employees, the record shows 932 individuals left our employ for one reason or another. Approximately a 60% turnover for 27-month period.

Of that 932, it was estimated there were 604 we thought could be trained for the job in which they were placed in less than twelve months. The other 328 were on the type of jobs that we estimated it would take twelve months or over to train. Of that 932 there were only 230 that went into military service. The rest went to other industries, either in our community or other communities throughout the country. Therefore, it will readily be seen that call to military service in itself was not the major or primary cause of our high labor turnover. So much for the company as a whole. This paper will concern primarily the Commercial Accounting Department in Dayton District. We have six operating districts in the Company, Dayton being by far the largest, since in it are approximately 65 to 70% of our total meters and customers.

For the twelve months ended December 1, 1942—and these statistics I am giving you for what they are worth with the hope they will give the reader some idea of the problem—we had a turnover in the Commercial Accounting Department of 104%. The Commercial Accounting Department in our company consists of the Credit and Collection, Customer Accounting, and Meter Reading Departments. Breaking the 104% down into three groups disclosed a turnover in our Credit and Collection Department of 67.6%, Customers Accounting 77.8%, and the Meter Reading 266.6%. In the three months ended November 30, 1942, the turnover in the Meter Reading Department was 87.5%. Practically a 100% turnover in three months. We had one meter reader at that time who had been with us more than a year. In fact, he had been with us some twenty years, and we thought he was a sure bet to stick with us but several months ago he, too, left for a job in a War Plant.

So, we had, very definitely a manpower problem in the entire Commercial Accounting Department and particularly in the Meter Reading Department, where it seemed we just couldn't keep men on the job for any reasonable period of time. We normally had in our Meter Reading Department twenty or twenty-one meter readers, reading roughly, 160,000 meters—both gas and electric. We had five bill passers who passed the bills in the City of Dayton, because they could pass them more economically than they could be mailed at 2c each. Our custom was to hire young fellows and put them on as bill passers and then, as vacancies arose, move them up to meter reading. During the period they served as bill passers we trained them in meter reading.

It was evident to us last summer that we couldn't keep bill passers. So we changed to a postal card bill, so that we could mail all bills for one cent postage. We began early in the fall to experience difficulty in keeping our meter reading schedule up-to-date. We could hire practically no one. Those we could hire were of such a quality we were often reluctant to let them go out to our customers' premises. So, we hit upon the idea of using high school boys as meter readers.

We have always had in our meter reading and billing schedules a reasonable amount of flexibility. We have never drawn it up too tight. So, we went to the Superintendent of the Dayton Schools, explained our problem, told him we wanted to try out high school boys for meter reading on the basis of working after school and on Saturdays. The first objection he raised was one of the boys sacrificing their education for work, having in mind that many of the boys, once they started to work regularly even though only on a part-time basis, would find a regular weekly wage income so attractive that they would be inclined to get dissatisfied with school and want to leave for full-time employment. We overcame that by giving him the assurance that we were just as anxious as he that their schooling be not sacrificed, and that we would therefore do everything to encourage them to stay in school and work only on a part-time basis. We agreed not to keep any boy who did not continue in school and furthermore, suggested that we would separate from the payroll any boy who did not keep his school work up to or above any minimum standard he, the Superintendent, wished to set. This we have done, working closely and co-

operatively with various High School Principals and the Superintendent's Office.

We have them report at the main office, which is centrally located, as soon as they are out of school. They come in around three-thirty in the afternoon and work for about three hours. We put a limit on the time they can be out on the job calling at the premises and that time is six o'clock in the evening. Then they work all day on Saturday—eight hours.

We put them on as rapidly as we could train and use them. They work about twenty-three hours a week and because of both the shorter work day and work week, their training or breaking-in period was naturally spread over a longer period than was normally the case with full-time employees, as probably you can readily appreciate. They get into some difficulty now and then, but you can't get a bunch of high school boys in, put them out on their own in meter reading, and expect them to conduct themselves as mature men. Not that we had had old men before, because we didn't. We always had young fellows just out or lately out of High School. That was probably one of our difficulties. We took young fellows, put them on as bill passers, and then promoted them to meter readers and from there to various jobs in the operating department as vacancies occurred. Because the average age level was low and because many of the boys were not married or only recently had reached that status, our meter reading force was vulnerable to the draft and also to the attraction of higher wages being paid in other industries engaged in War Work.

Therefore, we lost our regular and full-time meter readers faster than we could train and bring up to a normal production level the part-time High School boys. On March 7th we were down to five full-time men—normally our force consisted of twenty-one or twenty-two—plus some thirty-three or thirty-four High School boys, the majority of whom had had but a meager amount of experience. We gradually fell behind in our meter reading until at one time several months ago we were about sixty man days behind in our schedule. We were fighting to keep from getting farther behind day by day and from week to week. You'll appreciate we not only didn't want to slip farther, but we were doing our darndest to find some means for gradually getting caught up. Well you've heard it said that "The Lord helps those who help themselves," and I guess maybe He came through in our case, for lo and behold the Public School system Maintenance Employees went out on strike, schools were closed for a week thus enabling our part-time boys to work full time. A few weeks later the schools again closed for a week because of registration of War Ration Book No. 2, and when that was over we had not only brought our schedule up-to-date, but were even somewhat ahead, and ever since we have been able to keep up.

In addition to our Meter Reading troubles we were also behind in our billing schedule due to loss of help in our Centralized Billing and Customer Accounting sections, although we had been working practically six days per week since the beginning of the year. At the height of our difficulties we got nearly a week behind schedule and it was almost a continuous struggle to keep from slipping still further back with each succeeding week. We felt we were really feeling the pinch of the acute labor shortage we'd been reading so much about in the magazines and daily papers. We were about ready to grasp for almost any straw. It didn't make any difference whether it was the last one or not.

When Dayton, along with some 31 other cities or localities was declared a critical labor area, we had until March 31st to decide whether or not we would go to the forty-eight hour work week. We also, as you know, couldn't lay anybody off before March 31st if we did decide to go to the forty-eight hour week, and after March 31st we couldn't release any surplus help we might have without first clearing them through the local War Manpower Commission. Of course, we weren't particularly concerned about the lay-offs. We were primarily concerned about getting enough available manpower to do the job.

On March 14th, we went to a longer work week, scheduling the male employees 48 hours per week, the female employees, 44 hours. The reader may wonder why the forty-four hour schedule for women. That was because of a State law in Ohio, which says you shall not work a woman more than eight hours in any one day and more than six days in any one week. It also specifies that in a manufacturing industry you can't work a woman more than a total of forty-five hours per week.

In the beginning we thought all our employees would certainly jump at the chance to go to forty-eight hours but women are sometimes peculiar individuals. During the period from February to March 14th, we sort of, as one does, inquired around, and we found out that a number of our women employees just didn't want to work six days a week. They had a certain amount of shopping to do and a certain amount of beauty parlor attendance to take care of and therefore, many of them seemed to prefer not to go to a forty-eight hour per week schedule.

We held meetings with all the employees prior to going to the extended work week and asked them for suggestions. We let them take a vote as to whether they wanted to work the longer hours in six days or five and one-half. If five and one-half, did they prefer to add all the additional time in the morning or afternoon or split it, coming somewhat earlier in the morning and staying somewhat later in the afternoon. The final decision was a 5½ day schedule for most groups and departments.

We had been working from eight to five, five days a week, generally speaking, but in our Commercial Office we had been on a 5½ day schedule—40 hours per week. So with the adoption of the longer work week we set our male employee working hours at 7:40 A. M.—5:20 P. M., Monday through Friday, with a daily one hour lunch period and 7:40 A. M. to 12:20 P. M. on Saturday. For female employees the schedule was eight to five Monday through Friday and eight to noon on Saturday.

We made no change in our office hours. Last fall when our difficulties began to pile up we reduced our office open hours from the forty-nine hours per week to forty-five. We concluded that if we changed back to longer office hours at this time it was not going to help us solve our present problem of making available the maximum amount of manpower so we didn't change them.

At the time of our adoption of the longer work week, we were not faced with any particular problem of surplus personnel. We had been, figuratively speaking, almost staggering along and when we got the extended work it was somewhat like a distance runner getting his second breath.

By increasing our work week 10% for women, 20% for men, theoretically at

least we should have been in a position to reduce our work force from 10% to 15%, but it should be remembered we did not have a normal or complete force to begin with and many of those we did have lacked experience, having been added to the payroll during the preceding twelve months.

In spite of the fact that we had some 35 to 40 employees engaged in meter reading, since all but four or five were part-time, it was evident extension of the work week would make but little additional manpower available in this group.

As explained earlier we had been working six days per week in our Centralized Billing Department since the first of the year and were having difficulty keeping up to schedule, so there was no surplus to be found there. Our cash posting we do in the evening after office closing hours. We normally have five young seminary students on this job. But even seminary students had been attracted by the higher pay to factory jobs, so we were getting by with three of our regular or normal force, plus four high school boys working three hours per evening each. With the advent of the longer work week we dispensed with two of these.

In our teller group, Credit and Collection Department, Customer Contact Group, and Customer Accounting Department, we had a number of part-time employees. Not high school students, but girls and women—most of them married—who had only limited home responsibilities and, therefore, had the time and desire to work from fifteen to twenty-five or thirty hours per week.

The extended work week was certain to give us some surplus in these spots so we surveyed the situation carefully and planned to gradually eliminate any undesirables and those part-time individuals who would not be needed. As things turned out a number of the part-time people saw the handwriting on the wall and gradually left of their own accord. These plus the normal loss of regular employees took care of practically all the surplus and we, therefore, had to release only several whose work was unsatisfactory.

It has always been the policy in our Commercial Accounting Department to develop and maintain to the highest degree possible, flexibility in our working force. By that I mean most employees are broken in on more than one job by switching them from one working unit to another. Such a policy we firmly believe helps to keep employees on routine work from becoming dissatisfied and "going stale" because we are able to give them some variety of work. It also provides us with employees who can be readily shifted from one spot to another to plug any gaps or shortages that arise from time to time due to emergencies, peak demands or other unforseen and unanticipated circumstances.

For example employees in our Customer Contact Group have always done a variety of miscellaneous clerical jobs, either at their Customer interview desks or away from their normal work place, during slack periods in their own group. And I am sure in spots such as this, where none of us can fully control the flow of work, we all have peaks and slack periods.

Our tellers have been similarly trained and are switched as the needs arise. Such flexibility is of particular value now in those groups whose main job it is to wait on and deal with the public in our Commercial Office. Because with the extended work week and no change in office hours the male clerks are on duty 8 hours per week that the office isn't open to the public, and the women—while on a 44-hour work week basis—are on for 4 1/3 hours. And in order to get reasonable efficiency from our working force these employees have to be kept busy at other than their normal jobs during such time.

So, the normal course of business has taken care of most of our slack. We still have some. We are not yet working quite so efficiently as we do in normal times, but we feel further improvement will be attained as we have more chance to work at it. Certainly, we are in a much improved position as compared to the situation we were in three or four or five months ago. I think the change to a longer work week was made with a minimum of confusion and disturbance. Generally speaking, we had no unfavorable reaction from the employees at all. Of course, I don't know why we would when the change resulted in a 30% increase in pay for men and a 15% increase for women.

In going to the longer work week we made no change in basic wages. All time worked over and above forty hours is on the basis of time and a half. Our company policy relative to overtime pay for straight time employees is that such employees must actually work—be on the job—more than forty hours before they get overtime. In other words, you can't be off on Monday and put in Saturday and figure Saturday as a time and a half day.

As employees in the Supervisory group, who in accordance with the Fair Labor Standards—Federal Wage and Hour—are classified as executive, are and have been exempt from overtime, these individuals when the longer work week became effective were given an increase in their base pay or rate of 20%. This you can readily appreciate was equivalent to additional pay on a straight time basis—rather than at time and one-half—for the additional hours they are required to put in on the job. Such change was made for all supervisors whose base pay was less than $5,000 per year, and those individuals in this classification whose base pay plus 20% brought them above $5,000 were limited to a change which brought them up to a figure of $96 per week or $4,992 per year.

Before the changes in base rate for those in the executive classification were made, application for such changes was made to the Wage Stabilization Unit of the Internal Revenue Department and that approval obtained.

Now, briefly, our results. I think we can say there has been a decided improvement in our employee attitude and morale due to the higher weekly income. We have noticed a reduction in absenteeism. Maybe that is due to improved employee morale, but I am certain it is also because of the fact that if an employee is off for one day and thereby loses eight hours, he or she gets no overtime pay, but instead only the basic 40-hour wage. We have noticed an improvement in tardiness, not that we had a serious problem before, but what was a reasonably good record has been improved. There is a very noticeable relief in pressure of work on the employees, supervisors, and the organization in general. There is a feeling that the rather heavy pressure under which we had been working has been removed and we are getting more nearly back to normal working conditions. We have been able to bring our work up to date and we are keeping it up. The quality of work has improved and I feel will continue to do so. Because employee morale has risen they feel better, generally speaking, and naturally they make a greater effort than they did before. Such are the tangible results we have noticed.

Pole Top Resuscitation Instruction Manual Ready for Publication

By W. R. Smith

Past Chairman Accident Prevention Committee, EEI and Resuscitation Sponsor of the Committee

THE Accident Prevention Committee of the Institute is pleased to announce immediate publication of an instruction manual giving the technique of pole top resuscitation. The manual has been prepared by the Committee in the interest of electric light and power companies and others who may wish to train their men in the technique of this method of administering artificial respiration.

Throughout the years since the Schafer Prone Pressure Method of Resuscitation was approved by the National Electric Light Association, predecessor of the Edison Electric Institute, and endorsed for use throughout the electric light and power industry as the standard technique for giving artificial respiration to victims of electric shock, there have been many instances in which the method was successfully administered, natural respiration restored, and life saved. As gratifying as these cases have been, in a large number of others, efforts toward resuscitation were unsuccessful.

Outstanding researches on the part of eminent physiologists, nerve and heart specialists, and electrical enengineers have brought forth much in the way of authoritative explanation of the nature of the effects of electric shocks on the organs of the physical body. These investigations showed that, aside from serious burns, heart fibrillation and suspension of the respiratory function were the two most serious effects of the passage of dangerous electric currents through the body. Heart fibrillation was found to be fatal in almost all instances since the heart does not usually recover from such condition spontaneously and no first aid measures applicable to field use were practicable. Suspension of respiration was, in general, overcome by prompt use of the prone pressure technique.

All authoritative opinion has directed attention to the importance of artificial respiration being started "as soon as possible" in all cases of suspended respiration, regardless of causes, and instructions issued throughout the electric light and power industry have emphasized this. However, the special significance of this to cases in which electric shock was the cause was not appreciated at first and not until it was realized by light and power companies that very few of those who received shocks while working on poles or other elevated structures were being resuscitated. Whereas it may be concluded that some of these did not respond because of heart fibrillation yet the loss of time in getting the victims to the ground seemed definitely to be the reason why many of these cases, those of respiratory block only, did not recover. The period within which artificial respiration would have to be begun in order to be effective had passed.

In presenting these instructions, the Accident Prevention Committee recognizes and desires to direct attention to the thoughtful approach to the subject that was taken by Mr. E. W. Oesterreich and his associates in the Duquesne Light Company and which resulted ultimately in the development of the Pole Top technique. The Committee considers that in the development of the Pole Top Method of Resuscitation an important contribution was made to the subject of artificial respiration and, as a consequence, a procedure was given to the workers in the electric light and power industry by means of which many lives have subsequently been saved. On behalf of the Institute, those to whom Edison Medals have been presented, and especially those whose lives have been saved, the Accident Prevention Committee expresses appreciation to Mr. Oesterreich and his associates.

As a result of a comprehensive study of the problem by the Duquesne Light Company during 1931, the method now known as Pole Top Resuscitation was developed and presented to the electric light and power industry in 1938 by Mr. E. W. Oesterreich, General Superintendent of Distribution of that Company (see *Edison Electric Institute Bulletin*, March, 1939, page 119). This study included a thoroughgoing investigation of ways and means by which the elapsed time after the shock to the starting of resuscitation could be reduced. The further this investigation was carried the more evident it became that it was necessary to develop a technique which would make possible application of revival measures at the location where electrical contact occurred.

After exploring the possibiiities of applying any modification of the Prone Pressure Method with pressure on the back, the thought was developed that resuscitation could be attained in another way. Ultimately the technique now known as Pole Top Resuscitation was perfected. Essentially, this technique partakes of the main principle of the Prone Pressure Method, as shown by laboratory investigation, in that it produces artificial respiration through manually applied alternating *upward pressure and release of the abdominal viscera against the diaphragm* in a plunger-like movement which in turn causes an outward and inward movement of air into the lungs. It is of particular interest in this connection that Dr. Schaefer, originator of the Prone Pressure Method, in a letter written in 1928, stated: "Originally I was under the mistaken impression that the emptying of the lungs was in large measure produced by compressing the lower part of the chest, but I am now sure this enters very little into the problem. The important thing is to *press the abdomen* against the ground *so as to force the abdominal viscera against the diaphragm and drive this upward.*"

Over the past several years since the Pole Top method was given to the industry, it has been adopted by many light and power companies and reports have been made on a large number of successful applications. In the period between October, 1933, and August, 1943, 33 Edison medals of the Institute were awarded for cases of successful re-

(*Continued on page* 316)

POLE TOP RESUSCITATION

A—DEFINITION

1. Pole Top Resuscitation is a technique by means of which artificial respiration may be given to a lineman who, while working on a pole, receives an electric shock which suspends normal respiration. Aid can thus be given immediately without the delay incident to lowering the victim from the pole in order that he may be laid in the prone position.

2. Pole Top Resuscitation is intended to supplement the prone pressure method and is for use as an emergency measure under those conditions where it is impossible to quickly place the shock victim in the prone position.

B—GENERAL INSTRUCTIONS

1. Signal

Any member of a line crew who observes that a man on a pole has received an electric shock shall clearly and distinctly call out. This is to be followed by an immediate indication of where the victim is and the calling out of his name.

2. Precautions

Those who go to the aid of an electric shock victim on a pole shall take all precautions for their safety. Rescuers who are on poles shall descend carefully. Whereas it is important that the victim be reached and artificial respiration started as quickly as possible, undue haste, with the accompanying exhaustion of rescuer or operator, may lessen their ability to do what is required when they reach the victim.

3. Protection

The rescuer shall wear rubber gloves and rubber sleeves (if required) and, as he climbs and approaches the victim, he shall observe pole conditions and in the safest way to himself proceed to free the victim from contact, if this is necessary. He must do this in a safe manner that does not expose any unprotected portion of his body to contact with the victim's body or any nearby uncovered elements of the electrical system (Fig. 1).

4. Procedure

(*a*) The rescuer shall examine surrounding conditions and, if satisfied that artificial respiration can be safely administered, proceed to do this with the least delay.

(*b*) He will not take time to place rubber protective equipment in proper position or restore any that has become dislodged unless this is essential to the safe administering of resuscitation.

(*c*) If he should decide that it is not safe to attempt resuscitation, he shall proceed with arrangements for lowering the victim as quickly as can be safely done.

C—POLE TOP TECHNIQUE

1. Clearing the Victim

The first person to reach the victim clears him from electrical contact, letting him hang alongside the pole from the safety strap.

2. Administering Artificial Respiration

(*a*) The operator (one who will administer artificial respiration) takes a position on the pole below the victim, and after placing his safety strap around the pole (at a point above victim's spurs) proceeds to work his way upward with one leg of the victim on either side of his safety strap, and with the victim's body between himself and the pole. (See G-2.) Tools which may interfere

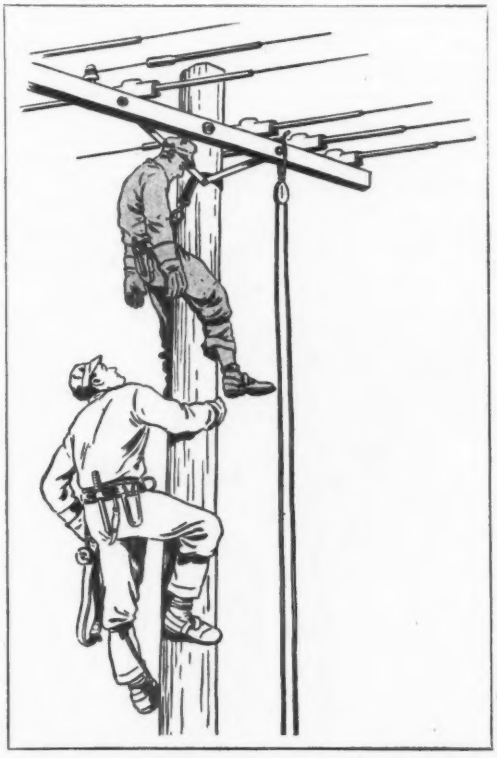

Fig. 1. Rescuer Observes Pole Conditions and Plans His Action. He Will Remove Tools from Victim's Belt

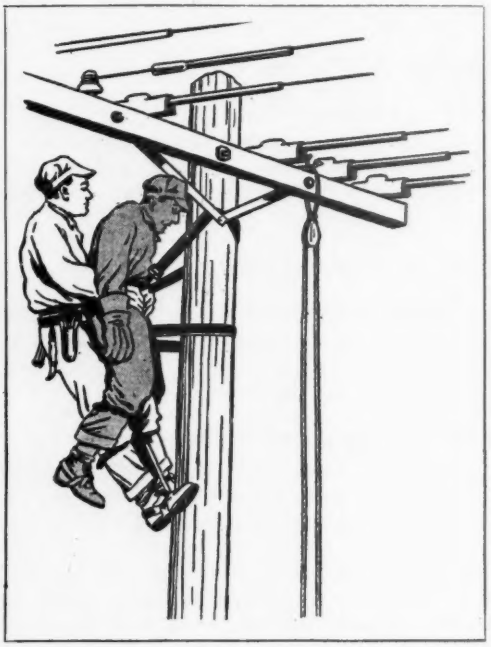

Fig. 2. Victim in Position on Operator's Belt for Artificial Respiration by the Pole Top Method. Note that Operator's Hands Are Below Victim's Belt

with resuscitation or injure rescuer should be removed from the victim's belt. When the safety strap is as high as possible between the legs of the victim, the victim is held in a straddle position on the operator's safety strap. The operator takes a step up and places victim in position for resuscitation. The victim's safety strap should remain around the pole and can be effectively used by operator as an aid in keeping victim in desired position. It should not be unsnapped or cut until the victim is to be lowered or is effectively supported by a hand line.

(*b*) If the victim's mouth can be quickly examined it should be cleared of foreign substances and the tongue pulled forward to clear the air passage. No time should be wasted on these details. The head should then be pushed slightly forward.

(*c*) The operator encircles with his arms the waist of the victim (underarm), placing both hands on the abdomen, thumbs below the lower ribs and fingers touching (Fig. 2).

(*d*) With his arms and hands, the operator compresses the victim's abdomen in an upward motion. At the finish of the stroke, the hands are cupped with the fingers depressing the abdomen under the breast bone. The pressure is then quickly released and reapplied at a frequency of 12 to 15 per minute, until the victim regains consciousness or is to be lowered to the ground.

(*e*) If the victim recovers sufficiently to breathe naturally, the operator should retain him in position and under control until the violence sometimes associated with recovery has passed, and the victim has become rational. The operator

Fig. 3. Assistant Rescuer Removes Climbers and All Remaining Tools from Victim's Belt. Attached to His Belt Is the Rope Which Will Be Used to Lower the Victim

Fig. 4. Assistant Rescuer Has Put Line Hose in Position to Cover Exposed Wire and Placed Adequate Line About Victim's Body. Strain Is Taken by Assistants on Ground and Victim's Belt Is Removed

must be prepared to restrain the victim's arms in any cases of violence whether during or after resuscitation and thus prevent any second contact where conditions make this possible. Artificial respiration is to be immediately resumed if the victim again ceases to breathe.

(*f*) Additional workmen, as assembled, will obtain and arrange rope rigging on the structure, securing the victim to the lowering line without interfering with the operator's motion (Figs. 3 and 4).

3. Lower to the Ground

As soon as the tackle has been adjusted, the victim is lowered to the ground. (See G-3.) A fiber hand line of strength equivalent to at least a one-half inch diameter Manila rope should be used. Lines of $^5/_8$ in. or $^3/_4$ in. are considered preferable. This line should first be passed over a crossarm and not over crossarm braces, sharp-edged surfaces nor through a pulley. The line should be passed under the arms and secured, preferably in front, by at least three half hitches. (See G-4.)

4. Lay on the Ground

Whether or not the victim has fully recovered and is breathing when he reaches the ground he should be laid prone at once and in proper position for the immediate administering of artificial respiration by the prone pressure method if this should become necessary. At this time the victim must receive proper treatment for shock and especially be kept warm. When it is apparent that artificial respiration is no longer necessary, care of the victim should be continued in accordance with regular first aid procedure until medical help is obtained.

D—PROCEDURE OF ASSISTANT RESCUERS

1. Assistant rescuers should wear rubber gloves. Rubber sleeves should also be worn by any assistant who, in his movements, may expose his arms to contact with wires that are alive or may become alive. Assistants should be very deliberate, taking care not to interfere in any way with the operator.

2. Assistants should make certain that neither the victim nor the operator is exposed to live conductors, and should cover all possible sources of contact, making certain that line hose, blankets, etc., have not shifted. They should remove the victim's climbers and also any remaining tools from his belt to prevent possible injuries.

3. They should stand by to assist in lowering the victim to the ground when the operator gives the word. (See G-3(d).)

4. Medical aid should be summoned as soon as possible.

E—TRAINING OF CREWS ESSENTIAL

1. In order that this method may be administered in the most efficient manner, all line crews who are to use it should be trained and drilled in this technique until it has been thoroughly mastered. Such training will eliminate loss of time, increase efficiency of the resuscitation process, put rescuers at ease, and avoid needless haste, thus guarding against accidents.

2. It is recommended that crews that have been trained practice the pole top method and the Schafer prone pressure method on regular schedule of not less than once in every three month period.

F—AFTER-SHOCK PRECAUTIONS

1. Under no conditions should a victim of electric shock be allowed, after resuscitation, to climb down the pole or other structure. He should be supported by a hand line and lowered thereby.

2. Attention is called to the importance of immediate rest for any victim of serious electric shock, especially if there has been unconsciousness. He should be under constant observation and should not be allowed to sit up or walk until placed in the care of a doctor.

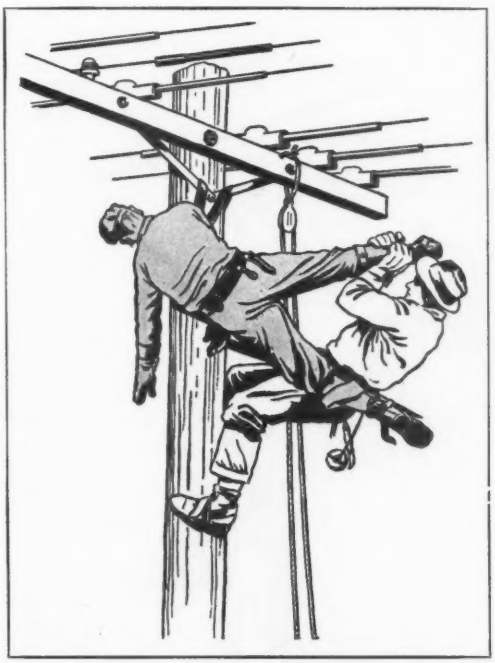

Fig. 5. "One Leg Over Head" Method of Placing Victim in Position on Rescuer's Belt. Technique Employed Guards Against Injury to Rescuer's Person or Gloves from Victim's Spurs

G—GENERAL COMMENTS

1. Other Applications

This technique may also be applied in situations where artificial respiration is required but where the victim cannot be placed quickly in the conventional prone position, such as when in a boiler between tubes.

2. Alternate Approaches

Experience has shown that other methods of placing the victim in position are practicable and even preferred under some conditions. The more common variations from the method described are:

(*a*) *One Leg Over Head*—Rescuer puts his safety strap about pole a little below the line of the victim's body belt. Rescuer then grasps one of victim's legs, lifting it well above rescuer's head. Rescuer then swings victim's body so that he passes his head under and between victim's legs. The victim should now be astride rescuer's safety. Rescuer takes two short steps upward and proceeds with resuscitation (Fig. 5).

(*b*) *Side Saddle*—Rescuer places safety strap around pole on a line with the victim's hips. Rescuer then reaches down and takes hold of victim's legs slightly below the knees and elevates them, making the victim's body pivot in his own safety belt. He then takes two short steps upward, pulls victim back against his chest and proceeds with resuscitation. (This procedure is found to be desirable when pole conditions make impossible or difficult the approaches suggested in paragraphs 3 under "Technique" or *a* above. It can be used either right or left as pole conditions make desirable.) (Figs. 6 and 7.)

(*c*) *Both Legs Over Head*—Rescuer places safety strap around pole on a line with victim's hips. Rescuer then reaches downward and grasps both legs of victim slightly below the knees and swings both legs over his head. This places the victim on rescuer's safety strap in side saddle position with legs over one side. Rescuer then proceeds with resuscitation. (This is an alternate to the "Side Saddle" (*b*) for conditions where it is best to swing the victim's legs over to the other side of the operator.) (Figs. 8 and 9.)

3. When to Lower Victim

The length of time that resuscitation should be continued on the pole will depend upon circumstances. Everything considered, it is deemed desirable to get the victim down from the pole as soon as this is advisable. Present good practice suggests the following:

(*a*) In the interest of promoting careful, unhurried action, a minimum of 50 respirations is suggested before lowering. This accomplishes two desirable things:

Fig. 6. "Side Saddle"—First Position—With Right Hand Under Victim's Knees and Left Hand on Shoulder Rescuer Pivots Victim in His Belt

Fig. 7. "Side Saddle"—Final Position—With Victim's Body Balanced in His Belt, Rescuer Has Moved Up and Pulled Victim Onto His Belt

Fig. 8. "Two Legs Over Head"—First Position—Rescuer Places Right Hand on Victim's Right Leg Iron as Shown and with Left Hand Keeps Victim's Legs Together

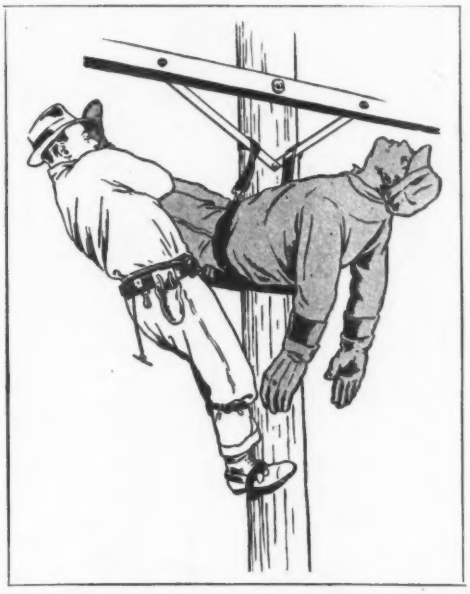

Fig. 9. "Two Legs Over Head"—Second Position—Rescuer Has Swung Victim's Legs to Other Side of Pole. As Victim's Body Pivots in Belt Rescuer Proceeds to Complete Side Saddle Position as Before but Reversed. See Fig. 7

It relieves all workers of anxiety—affording a period of approximately four minutes for preparations to lower.

It provides for the giving of artificial respiration for a sufficiently long time to effect resuscitation in many cases and establishes a good beginning for those who will need to be worked on longer.

(*b*) Pole conditions and also the condition of the victim will determine how much longer resuscitation should be continued on the pole. If conditions are not too favorable, victim should be lowered when all is ready. If victim is showing signs of recovery and pole conditions are not unfavorable, resuscitation should be continued somewhat longer. If it is desired to continue with pole top resuscitation for longer periods, possibly involving changes in operators and even to giving resuscitation while lowering, the details can be worked in to the company procedure and the linemen trained accordingly.

(*c*) When the victim is revived on the pole and pole conditions are favorable, it is suggested that the victim be kept on the pole in relaxed position under the control of the operator for a few minutes. This will lessen the likelihood of a relapse into unconsciousness which sometimes occurs when shock victims attempt any physical exertion too soon.

(*d*) Experience has suggested the following technique when a still unconscious victim is to be lowered from a position such as is shown in Figure 4. The assistants on the ground take the weight of the victim on the hand line and at a moment agreed upon by the operator and the assistant rescuer the operator drops down below the victim. The assistant rescuer swings over and with a hand on back and abdomen of victim maintains the cadence and gives resuscitation until the first rescuer has moved down and out of the way. If there are wires of any description below which the victim will have to clear as he is lowered the first rescuer will take a proper position to guide the victim past or through these wires. At a signal from the second rescuer to the assistants on the ground he moves out of the way and the victim is promptly lowered and placed in position for the immediate resumption of artificial respiration by the prone pressure method with a minimum of delay.

4. Alternate Hitches

The only standardization that is essential in the manner in which the victim is secured to the hand line concerns the requirement that the method be positive and safe in all respects.

An alternate method to that given in paragraph

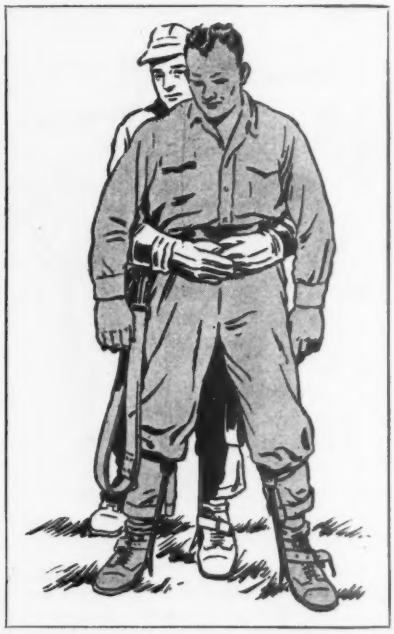

Fig. 10. First Position of Hands, Relaxed, Before Inward, Upward Motion to Raise Abdominal Organs

C-3 that has been found practicable, particularly when it is desired to continue resuscitation while the victim is being lowered, is one in which the line is fastened to the two "D" rings of the victim's belt. Such support, however, is close to the center of gravity of the victim and is, therefore, not suited to free lowering of the victim unless the victim's safety belt is first placed under the arm pits and properly secured to maintain him in upright position while being lowered.

5. Effectiveness of the Method

Tests and experiments conducted in 1939 by Drs. W. B. Kouwenhoven, D. R. Hooker and O. R. Langworthy, of Johns Hopkins University, reported in "A Comparison of the Relative Efficiency of the Schafer and Pole-Top Methods of Artificial Respiration" (A.I.E.E. Technical Paper 40–150, *Electrical Engineering*, February, 1941; *Transactions*, Vol. 60) show that ventilation of the lungs obtained by the pole top method is adequate and that the subject receives sufficient oxygen to satisfy his needs. (See also fourth item in References list, p. 8.)

The object of the pole top technique is to raise the abdominal organs against the diaphragm in a manner such that pressure will be exerted on the diaphragm uniformly across the body. Extreme pressure must be avoided and localized pressure in the center is undesirable and will lessen the effectiveness of the resuscitative effort. The cupping of the hands is to prevent the hands sliding apart and off the victim and is not for the purpose of giving localized center pressure (Fig. 10).

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ACKNOWLEDGMENT

The Accident Prevention Committee desires to acknowledge with appreciation the contribution made by its members and others to the development of this pamphlet through submittal of instructions and other information, and review of preliminary drafts.

IMPORTANT REQUEST

In order that the study of electric shock and artificial respiration which is being carried on by the Accident Prevention Committee may be aided, it is requested that reports be made on all such cases to the Edison Electric Institute. Copies of "Form A—Report on Case of Electric Shock" may be obtained from the general office of the Institute, 420 Lexington Ave., New York 17, N. Y. for this purpose.

Research on Graphitization of Piping Is Under Way

SOME months ago certain effects were observed on piping, valves, and other appurtenances in high temperature and high pressure steam service which caused concern as to the ultimate durability of the materials affected. The effects observed were ascribed to a process of graphitization within the materials and the need for further investigation and, probably, of systematic research was indicated. A joint subcommittee was set up by the Prime Movers Committee of the Edison Electric Institute and the Power Generation Committee of the Association of Edison Illuminating Companies with Mr. Alexander D. Bailey, of the Commonwealth Edison Company, as Chairman, and Mr. Sabin Crocker, of the Detroit Edison Company, as Secretary.

This Joint Sub-Committee on Graphitization of Piping has formulated a program of investigation and, after determining that systematic research was necessary, has negotiated an arrangement with the Battelle Memorial Institute for the necessary laboratory research and correlation of field investigations. Among many other urgent activities, such as preliminary field investigations, the Joint Sub-Committee has prepared a first progress report and a systematic program, both of which are published hereunder.

Progress Report No. 1 on Survey of Graphitization of Piping

August 26, 1943

JOINT SUB-COMMITTEE ON GRAPHITIZATION OF PIPING

SABIN CROCKER, *Secretary*
ALEX. D. BAILEY, *Chairman*

Examination of the 15 questionnaire replies so far received shows that graphite may be found in the following materials when subjected to prolonged service at temperatures in the neighborhood of those listed:

Material	*Temperature, F*
Carbon steel, low and med. carbon	835 ± 20
*High-aluminum carbon-moly pipe	885 ± 20
*Low-aluminum carbon-moly pipe	975 ± 20
Carbon-moly casting	950 ± 20

There are many exceptions to the above findings and it should be emphasized that graphite *may* but not necessarily *will* be found in the above materials if the operating temperatures are as given above. The length of service and extent of temperature variations above the nominal operating temperatures also have an important influence.

While both upsetting and welding operations may lower the temperatures at which graphite forms and seem to have an all important relation to serious graphite segregation, the phenomenon of graphitization is not limited to welds or to upset joints.

The type of graphite formation found at one station and to a lesser extent at another, which may be described as "a connected chain of segregated graphite at grain boundaries," has been reported for a cast carbon-moly valve body adjacent to a casting-to-pipe weld. The valve had been in service 44,000 hr, of which 21,000 hr were above 900 deg F and some 1300 hr above 950 deg F. The pipe side of the weld which had been normalized after upsetting showed only a small amount of dispersed graphite. Two other pipe-to-casting welds in the same line showed no graphite. A bend test on a specimen cut from the weld prober sample of the seriously affected valve end failed along the graphite segregation line for about 60 to 70 per cent of the width of the bend specimen.

With the exception of the above case of definite graphite segregation, the graphite reported in the pipe metal proper and in the zones about 1/16 to ⅛ in. from the welds has been of a dispersed form predominantly within the carbide containing areas. In this form, even if quite pronounced when examined with a microscope, graphite does not seem to seriously impair the physical properties, as far as tensile, bend and impact tests are concerned. The possible effect on creep strength is being checked on a partially graphitized across-the-weld specimen from a carbon steel welded joint.

It will be noted that the above summary differs from the conclusions given in Appendix A distributed with the minutes of the EEI Prime Movers meeting of May 10 and 11, 1943, in the following respects:

(1) A serious case of graphite segregation in a carbon-moly casting adjacent to a casting-to-pipe weld has established that such trouble *is not confined to pipe as at Springdale and Rivesville.*

(2) Graphite, although of a dispersed form, has been reported for the low-aluminum variety of carbon-moly pipe. This pipe was used in connection with a mercury boiler and had been in service approximately 18,000 hr at an average temperature of 976 deg F with swings to 990 deg F. Note that, the pipe was carrying mercury vapor. *This finding shows that the latest version of carbon-moly pipe is susceptible to graphitization.* It should be noted, however, that the operating temperature was from 25 to 50 degrees higher than usual for present-day steam power plants.

(3) Two companies reported graphite in carbon steel pipe adjacent to welds at service temperatures of 835 and 850 deg F, while heavy graphite nodules were reported in a

* Carbon-moly pipe made prior to 1939 to ASTM Specification A158 and to A206-37T and 38T was of the high-aluminum variety, i.e., had 1.5 lb. or more of aluminum added per ton after deoxidizing with silicon. The low-aluminum variety has approximately 0.5 lb of aluminum added per ton.

carbon steel pipe in a mercury boiler installation after 42,000 hr at an average temperature of 940 deg F of which 20,000 hr had been above 950 deg F. Note that, the pipe was carrying mercury vapor. These findings verify the need for including carbon steel in investigations of graphitization. At the same time these reports indicate graphite must have been present to some extent in many installations without any untoward result.

The reports so far obtained in this survey have amply demonstrated the need for a fundamental study of the conditions which may produce graphitization of piping materials. The results of other investigations now underway or planned should be sent in as early as possible in order that the planning of the fundamental investigation may have the benefit of such service experience. Reports received before Sept. 15 will be of material assistance in such planning.

Arrangements have been made with Battelle Memorial Institute for carrying on the fundamental research program under the direction of Dr. S. L. Hoyt, and the material so far collected has been turned over to him for study. The scope of the project will soon be worked out in conference between Dr. Hoyt and the committee and actual research will then be started. The expense of the investigation will be borne jointly by the EEI and AEIC out of treasury funds without using special subscriptions from individual companies. Checks solicited under the original contribution plan have been returned to the subscribers.

Progress reports will be issued from time to time as the investigation progresses, and final reports covering separate phases of the project will be issued as each phase is completed.

Program for the EEI-AEIC Investigation of Graphitization of Plain-Carbon and Carbon-Molybdenum Steel Piping

Battelle Memorial Institute, August 28, 1943

The need for this investigation arises from the finding at several power plants that graphitization of pipe, valves, or other appurtenances has occurred, thereby weakening the structures affected, in some cases, to such an extent as to create a serious hazard. This phenomenon is of such character and extent as to make it imperative that immediate steps be taken to determine what can be done to avert this difficulty in both present and future installations.

Object

The objects of this investigation are (1) to determine the factors which produce graphite and segregation of graphite in plain-carbon and carbon-molybdenum steel; (2) to investigate the technique of restoring graphitized metal to a usable condition; (3) to determine the best technique for removing and replacing seriously deteriorated metal; and (4) to develop necessary information for recommended practice to avoid graphitization.

As fast as is possible, information on the repair and reconditioning of present lines and the installation of new lines will be reported.

Cause and Mechanism of Graphitization

The following factors have been suggested as possibly affecting graphitization and graphite segregation. The validity and significance of each will be examined by means of service records and the important points will be tested experimentally in the research program.

A. Materials
  1. Steel Composition
    a. Alloying elements—C, Mn, Mo, Cr.
    b. Killing with Si and Al.
      i. Closeness of control.
      ii. Effect of Al_2O_3.
  2. Structure of Steel
    a. Type of carbide (spheroidized, lamellar, etc.).
    b. Initial grain size and variations in grain size—effect of hot upsetting, etc.
    c. Grain growth characteristics.
    d. "Molybdenum" structure.
  3. Manufacturing methods and controls
B. Fabricating and Service Effects
  1. Thermal Gradients
    a. From welding.
    b. From localized heating for hot upsetting, corrugating, bending, "lapping," etc.
    c. From flame bevelling.
  2. Heat Treatment
    a. Normalizing.
    b. Annealing.
    c. Drawing, or stress relieving.
  3. Thermal Effects in Welding
    a. Welding preheat—rate, temperature, and continuity.
    b. Welding postheat — rate (heating and cooling) and temperature.
  4. Operating Temperatures in Service
    a. Constant.
    b. Fluctuating.
    c. Effect of shut-downs.
C. Mechanical and Thermal Stresses
  1. General
    a. Operating pressure.
  2. Localized or Concentrated
    a. From welding.
    b. From coarse tool feed in pipe bevelling by machine.
    c. From hot upsetting or forming.
    d. From vibration.
    e. From unequal distribution of loads in the pipe installation.
    f. From expansion and contraction of steam line.
D. Welding Processes
  1. Electrodes
  2. Procedure (sequence, number of passes, continuity, cleaning, etc.)
  3. Position
E. Effects of Air and Steam—probably not significant
F. Special Considerations
  1. Graphite Formation in Micro-Cracks
  2. External Sources of Carbon

Repairing of Damaged Pipe

A. Evaluation of Heat Treatment in the attempt to Redissolve Graphite and Leave the Welded Joint in a Sound Condition
B. Removal of Joint
  1. Machining or flame cutting
C. Rewelding Procedure

Acceptable Materials and Methods of Assembly

A. Selection of Steel, with particular reference to:
  1. Chemical Analysis, including elements which inhibit graphitization
  2. Deoxidizing Treatment
B. Recommended Practice for Installation
  1. Fabricating Parts of the Line
  2. Heat Treatment Prior to Installation
C. Recommended Welding Procedure
  1. Electrodes.
  2. Joint Preparation
  3. Sequence and Continuity
  4. Preheat and Postheat

RESEARCH

Part I. Correlation of Available Information

Data contained in questionnaires and reports from the various companies will be tabulated. Pertinent information will be reported as it is uncovered, but the principal use will be in orienting and guiding the experimental work. Data included in this tabulation will be:

(1) Specifications, heat numbers, chemical analyses, mechanical properties, deoxidizing practice, heat treatment, and mechanical treatment.

(2) Welding procedure, including end preparation, electrodes, position, sequence, continuity, preheat, and postheat.

(3) Metallographic examination of certain sections which, from the tabulated data, appear to have an important bearing on the problem.

(4) Special conditions which differ from those found for the majority of joints (corrugation adjacent to the joint, preheat, etc.).

Part II. Fundamental Research

The precise lines that this part of the investigation will follow are somewhat dependent upon the pertinent factors established in Part I. At present, it appears that work will develop along the following lines:

A. Development of techniques for positively identifying graphite. This will require metallographic equipment, including possibly an electron microscope, and microchemical analytical equipment, or X-ray diffraction equipment.

B. Study of the effect of possible factors involved in graphitization. The major effort of the investigation will be a controlled study of causes of graphitization. This will involve the development of a short-time test procedure. Test samples will be heated at 850, 950, 1050, and 1150 deg F. By determining the amount of graphitization at various times, the effects of the various factors on the rate of graphitization will be estab-

(*Continued on page* 318)

Adequate Wiring for Post-War Farm Electrification

By H. J. Gallagher
Consumers Power Company

SINCE Dec. 7, 1941, considerable publicity has been devoted to the important contribution electric service has made in helping the farmers meet the grave responsibilities that the war has placed upon them. Without the use of electric service, it would have been impossible for agriculture to have reached the national food production quotas, with the manpower and the farm machinery that was available.

The record of electricity's usefulness on the farm becomes still more impressive when we consider that only 39 per cent of the farms in the nation have electric service, although the farms that do have service are the better farms in the best agricultural areas of the country. This is particularly true in the twelve corn belt states that produce over 50 per cent of the nation's total food supply and where electric service is more extensively and more generally used than in any similar area of the country.

Farm Wiring Inadequate for Future Loads

The war test that electric service on the farm is so gallantly meeting is the most severe of all tests as to its real value to agriculture. It is also a test of its weakness, and one of the glaring faults of the program is the restricted use of service because of inadequate wiring of the farm buildings on the majority of farms having service. Many sources of information indicate that the bottleneck in farm electrification is lack of the proper kind of electrical equipment for farm work. It is true that this field is still in its infancy, but if all of the new and perfected uses of the future were readily available today they couldn't be extensively used on our farms because of the inadequacy of the farm wiring.

One of the early objectives of C.R.E.A. that was nationally accepted by electric companies and the extension divisions of land grant colleges was to educate the farmer on adequate wiring. More information was disseminated on the subject than on any other phase of farm electrification. Demonstrations, bulletins, lectures and radio broadcasts on adequate wiring were extensively used for the benefit of both the farmer and the electrical contractors. With all of this effort, the average farmer still refused to accept electricity as an important source of power. It was relatively impossible to project his conception of service beyond the lighting stage. In this he was aided and abetted by the low-bid contractor, who emphasized price rather than quality. The result is that many farmers have been unable to increase their war production program. The most common causes of trouble are the number and size of the conductors to outbuildings, the failure to have extended service beyond the residence, and the use of 30 ampere entrance services.

Any one of the three conditions form a serious bottleneck. There is relatively little an electric company can do in the matter of wiring on a customer's premises except offer constructive advice. The capacity of the entrance service switch, however, is subject to the ruling of the state regulatory commission, and some companies have included in their rural extension policy the requirement that all rural customers shall install three-wire service entrance connections of not less than 60 ampere capacity.

Utilities Can Do Educational Work Now

It is obvious that if the post-war possibilities in farm electrification are to be realized, the electric companies must devote additional effort toward educating their present farm customers in better wiring. The tendency of discontinuing wiring programs with established customers is a weak link that needs strengthening. The correction of these conditions must necessarily wait until after the war, although the recent WPB Utilities Order U-1-c makes it possible for some changes to be effected. While the actual job of rewiring is a post-war activity, dependent upon the availability of labor and materials, the educational program could well be started now.

This time the wiring story can be told with more authoritative background. Previously, the wiring program was presented to farmers who had no experience with electric service and who were unfamiliar with the electrical terms of wiring. Now, the presentation of good wiring can be based on the experience farmers have had, which will make them more sympathetic and understanding of the aid being rendered them.

Numerous opportunities will present themselves to the rural service engineers of the electric companies to emphasize the necessity of capacity wiring and the wisdom of doing it as soon as possible. Through farm visits, group meetings, Vocational Agricultural Schools and 4-H Clubs, the rural men can disseminate much valuable information on the kind of wiring job that will enable the farmer to more fully utilize the lowest cost and most flexible form of farm power available to agriculture. At the present time it is generally conceded that the amount of electric service used for domestic purposes in agriculture greatly exceeds other uses for farm purposes. This is an unusual condition, as never before in the long history of agriculture has any form of farm power been used more extensively in the farmhouse than on the farm. While electricity has changed the pattern of farm life and farm work by providing conveniences, comforts and labor-saving practices never before experienced in agriculture, it has not materially changed the balance in power requirements between the house and the farm.

Agriculture Is a Power Industry

Agriculture is primarily a power industry and ultimately the use of electric power on the farm will follow the course of other forms of farm power and the domestic use will be equalled and exceeded. The rapidity and economy with which this change will be effected will depend largely upon electric companies educating their farm customers in advance of a change. The most constructive procedure in this respect, and under existing conditions, is an extensive program on capacity wiring. To delay a "better wiring" program until equipment is again available will result in inadequate piecemeal wiring additions as new equipment is installed. This would prove costly to both the farmer and electric companies and would increase the difficulties, and materially retard post-war load-building activities.

Utility Sales Floors Become Wartime Service Centers

THOUSANDS of utility display floors and display windows, formerly used for demonstrating electrical appliances with their contribution to better living, were left vacant when manufacturers of this equipment stopped production of appliances and switched to the making of war materials. The Home Service Departments of the Utilities, coordinating their activities with the many national needs programs such as food rationing, Red Cross, Nutrition, Victory Gardens, Food Preservation, Salvage Drives to mention only a few, recognized the value of this space as a media for furthering these educational campaigns. Data on how utilities have made use of such floor space with educational exhibits, displays and information booths have been collected by a subcommittee of the Home Service Committee of the Institute and the following text and photographs indicate the range and variety of the display.

The Service Sales Department of the Central Illinois Light Company installed an experimental Victory Garden on the floor of the Peoria display room to promote interest in Home Victory Gardens. To insure proper light for growth of plants in an 8 x 9 box, twenty-eight 300-watt lamps were installed. These were individually mounted so that the height of the plants could be controlled. The initial intensity was approximately 500 foot candles.

The garden was part of the Nutrition and Information Center of the Company Home Service Institute, whose personnel is equipped to give information on the growing, preparation and preservation of foods. The garden proved to be an "attention getter" and when the center was officially opened over 600 people visited the display to view the garden and to obtain free literature on the subject of proper nutrition.

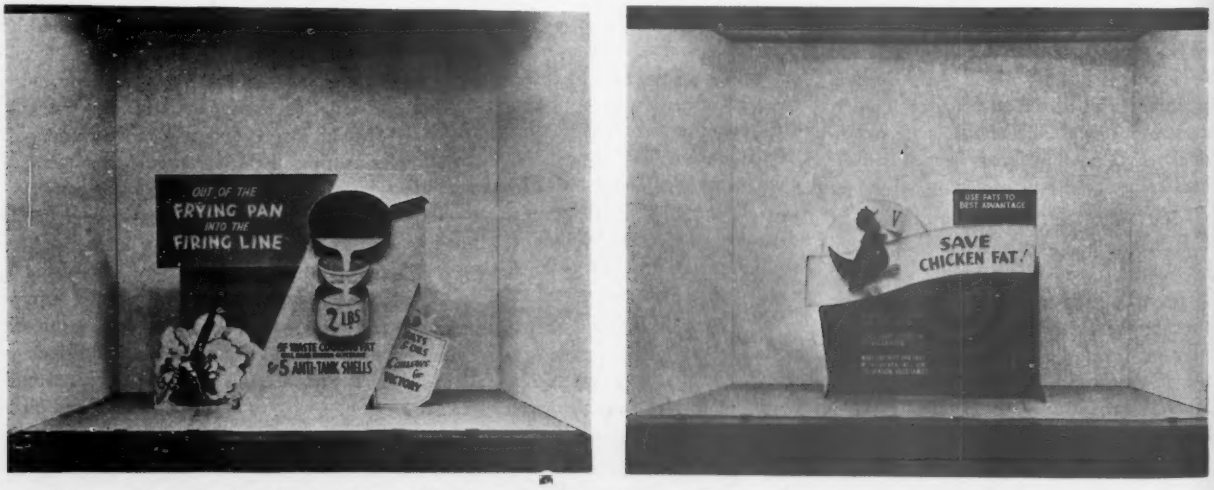
A Homemakers' Information Center was opened in March of this year by the Wisconsin Electric Power Company. One section provides for information on the care and use of appliances and one section distributed recipes and information on nutrition or any other subject of interest to women. The third section is for telephone information. The newspaper announcement of the opening showed the layout and listed the services available to customers visiting the Information Center.

Window displays have likewise been used to tie-in with special campaigns. The photographs of a window display, below, show how one utility, the Union Electric Company, has used this space to promote conservation of fats and oils. This company has tied in with both the Consumer Divisions of the Office of Price Administration and the Office of Civilian Defense. In working with the publicity directors of OCD and OPA, a schedule of pertinent subjects to be featured were secured from the two organizations Sketches were then made and approved by the two groups, then window displays were built featuring different phases of salvage.

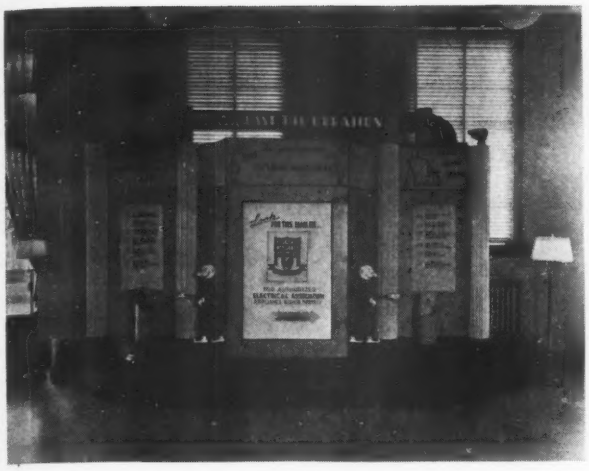
The sales floors of the Mississippi Power and Light Company were used for Nutrition Centers and a full-time Home Service Advisor was put in charge. In the smaller offices Home Service Advisors spent part time while volunteer workers from the group who had taken the Red Cross Nutrition class were asked to donate some time.

Other utility companies using display space for Service Centers include the Atlantic City Electric Company, which equipped a booth with all types of canning equipment and dehydrators. Literature on home canning was distributed and a Home Service Advisor was in attendance at all times to help customers with their canning problems.

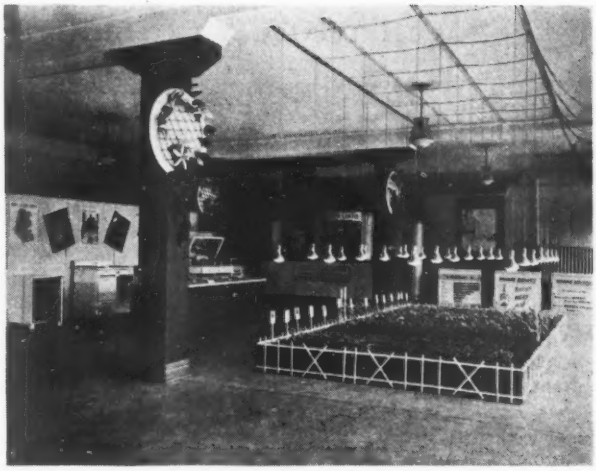
In addition to Service Centers, the utilities have prepared special floor and window displays to portray messages on timely war themes such as appliance care and maintenance, fuse replacements, Red Cross, Civilian Defense, Bond Drives, and many other war-need activities. The few photographs reproduced on these pages serve only to indicate to what extent the electric utilities, in addition to supplying adequate electric power for all war industries, have converted existing facilities from peace-time to war-time services.



Two-window displays of a midwest utility featuring Fat Salvage. Note tie in with controlled heat and refrigeration



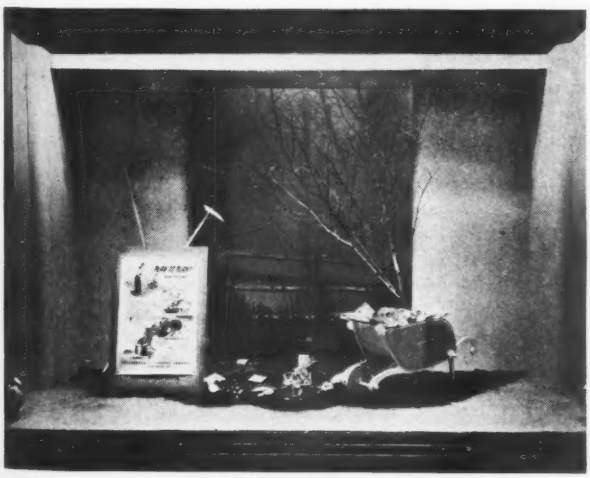
One of a series of floor displays emphasizing care and maintenance of equipment.



Victory Garden is "attention getter" for this service center

A part of display floor as headquarters for canning information.

Home Service advice helps housekeepers with canning problems.



Attractive window display to increase interest in Victory Gardens.

One of several booths on display floor serving as information centers.

Seven More Companies Win EEI Safety Merit Award

SEVEN member companies of the Edison Electric Institute, in addition to those listed in the May, 1943, issue of the EEI BULLETIN, have been presented with the Edison Electric Institute Safety Merit Award in recognition of outstanding results in accident prevention. The award is open to any EEI member corporate company or operating unit thereof whose employees have worked one million or more consecutive manhours without disabling injury accident.

The companies to which the award was presented this summer were: Alabama Power Company, Central Illinois Light Company, Consolidated Gas Electric Light and Power Company of Baltimore, Kansas Gas and Electric Company, The Ohio Power Company, Pennsylvania Power and Light Company and Virginia Electric and Power Company. Three of these companies qualified for more than one award, and in addition to the companies listed above another award was made to the Public Service Electric and Gas Company (N. J.), bringing the total awards to that company to four.

Manhour safety records of the companies or subdivision of companies noted above are as follows:

Alabama Power Company, Anniston District, Anniston, Alabama, Jan. 28, 1929, to Oct. 13, 1942—1,216,287 manhours.

Alabama Power Company, Martin Dam —Hydro Plant, Near Tallassee, Alabama, Jan. 1, 1927, to Jan. 1, 1943—1,699,350 manhours.

Central Illinois Light Company, Peoria, Illinois, June 19, 1942, to Jan. 27, 1943—1,169,876 manhours.

Consolidated Gas Electric Light and Power Company of Baltimore Power Transmission Stations, Baltimore, Maryland, July 3, 1939, to Dec. 31, 1942—1,314,215 manhours.

Kansas Gas and Electric Company, Neosho Steam-Electric Station, Near Parsons, Kansas, Jan., 1935, to July, 1942—1,097,140.8 manhours.

The Ohio Power Company, Canton, Ohio, Jan. 16, 1942, to March 26, 1942—1,220,597 manhours.

The Ohio Power Company, Steubenville Division, Steubenville, Ohio, Nov. 22, 1934, to Sept. 28, 1939—1,132,463 manhours.

The Ohio Power Company, Canton Division, Canton, Ohio, August 16, 1938, to Sept. 13, 1940—1,085,199 manhours.

The Ohio Power Company, Valley Division, Portsmouth, Ohio, Sept. 4, 1938, to June 26, 1941—1,210,328 manhours.

Pennsylvania Power and Light Company, Hazleton Service Depot, Hazleton, Pennsylvania, Jan. 12, 1933, to April 30, 1943—1,541,058 manhours.

Public Service Electric and Gas Company, Electric Engineering Department, Newark, New Jersey, June, 1, 1940, to May 31, 1943—1,175,637 manhours.

Virginia Electric and Power Company, Roanoke Rapids District, Roanoke Rapids, North Carolina, Nov. 1, 1936, to April 30, 1943—1,216,169 manhours.

Virginia Electric and Power Company, Electric Departments — Richmond District, Richmond, Virginia, Feb. 19, 1942, to Dec. 29, 1942—1,284,267 manhours.

Applications for the Award should be made by companies that can qualify to the Secretary of the Accident Prevention Committee of the Edison Electric Institute, 420 Lexington Avenue, New York, on forms provided for that purpose by the Institute. (Copies of the complete regulations may be obtained from the same source.)

The procedure for claiming the award and the process of examining applications and issuing certificates have been made as simple as possible, in order that none may be deterred from making a claim by reason of laborious preparation of exhibits and that no claim shall be delayed by excessive formalities, and yet that the awards shall have the dignity they merit. The only actual formality is final authentication by a permanent panel of judges nominated by our Accident Prevention Committee.

Post-War Demand for Power

(*Continued from page* 296)

volume of steel production and a supporting increased flow of power.

The expected construction of some 1,500,000 homes in the first decade after the war will bolster power demand inasmuch as the post-war home is likely to boast a greater use of electrical appliances and services.

To the increased industrial and domestic demand for power must be added the prospective greater demand for electricity by the country's farms.

For the utility industry then, the decade after the war should spell a steady rise in the demand for its services and a growing reliance on electric power to perform an increasing variety of industrial and domestic chores.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF MARCH 3, 1933

Of EDISON ELECTRIC INSTITUTE BULLETIN, published monthly at Philadelphia, Pa., for October, 1943.

State of New York.
County of New York.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Wilgar Coleman, who, having been duly sworn according to law, deposes and says that he is the Editor of the EDISON ELECTRIC INSTITUTE BULLETIN, and that the following is to the best of his knowledge and belief, a true statement of the ownership, management . . . etc., of the aforesaid publication for the date shown in the above caption, required by the Act of March 3, 1933, embodied in Section 537, Postal Laws and Regulations . . . to wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are: Publisher, EDISON ELECTRIC INSTITUTE, 420 Lexington Avenue, New York City; Editor, Wilgar Coleman, 420 Lexington Avenue, New York City; Managing Editor, none; Business Manager, none.

2. That the owners are EDISON ELECTRIC INSTITUTE, 420 Lexington Avenue, New York City, a mutual organization, not incorporated; Charles W. Kellogg, President, New York, N. Y.; J. C. Leighton, Treasurer, New York, N. Y.; H. S. Bennion, Vice President and Managing Director, New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

WILGAR COLEMAN,
Editor.

Sworn to and subscribed before me this 20th day of September, 1943.

(Seal) MAE B. WOODS,
Notary Public, Queens County.
(My commission expires March 30, 1944)

Accident Prevention in the Philadelphia Electric Company

By Roy M. Godwin

Director of Safety, Philadelphia Electric Company, Philadelphia, Pa., and member of the Accident Prevention Committee, E. E. I.

Reprinted from Executives Service Bulletin, of the Policyholders Service Bureau, Metropolitan Life Insurance Company

IN order to maintain uninterrupted service to war plants, the utility industry must do its utmost to protect its employees from injury at work, in the home, and on the highways. Great strides have been made in the utility industry over the years toward reducing losses due to accidents, and greater effort is now being exerted toward this end.

Employees of the Philadelphia Electric Company are proud of its contribution toward the reduction of accidents in their industry, and are mindful of their obligation to keep accidents at a minimum within the organization. Since 1928 we have brought about 83 per cent reduction in lost-time accidents, 71 per cent reduction in days lost due to accidents, and 94 per cent reduction in responsible automobile accidents.

In 1928, when I was placed in charge of accident prevention, we averaged 43 lost-time accidents a month. At that time I made a plea for reduction in accidents and set as our goal a month without a lost-time accident. While some of our people felt that this could not be attained, nevertheless there has been a constant downward trend. In 1942 we averaged 7½ lost-time accidents per month, indicating steady progress toward our goal of a month without a lost-time accident, which was almost reached in February 1942, when we had only one. In 1928 we averaged 51 responsible automobile accidents a month, but by the end of 1942 this had been reduced to three.

No particular activity can be given credit for the accomplishments of our employees in accident reduction. Our program is composed of many activities. If we were to name one factor as the most essential, it would be the wholehearted support of our management group. Little could have been accomplished without its counsel and support.

The general thought is that the operations of an electric, gas, and steam heat utility are hazardous, but so far as our company is concerned, this is not the case. Most of our accidents are not directly the types that result from the manufacture and distribution of electricity, gas and steam heat, but are rather common to all industries.

Fifteen years ago a large percentage of our accidents was due to electrical hazards, but in recent years this type of accident rarely occurs. We have now completed almost three years without a fatality due to electrical hazards. Years ago many employees in the gas industry were asphyxiated by manufactured gas. In our company not a single employee has been asphyxiated by gas since June, 1927, when the life of one employee was saved by fellow employees who applied the prone-pressure method of artificial respiration.

Safety Considerations

Looking back over a period of 25 years since I entered the accident-prevention field, I have long since come to realize that accident prevention must be a continuing performance, a never-ending effort, beginning with proper selection of new employees and thorough training of all employees. These activities are of the utmost importance to our accident-prevention work, as they have been instrumental in placing the employee in the kind of work for which he is best qualified.

We do not use "rule books." We have found that the placing of recommended safe practices in the hands of employees brings better results. In many of our departments safe practices are incorporated in their operating procedures. One factor that has contributed largely to the success of this method is that the employees were given an opportunity to take part in the preparation of these safe practices and operating procedures. Revisions are made when needed.

Safety committee meetings are held regularly in some departments, but in an industry such as ours it is not feasible to do this throughout the organization. However, accident-prevention work has been carried on successfully by direct contact in the field. So far as our experience is concerned, both methods have brought results. We have found that safety committee meetings, properly conducted, can be very effective.

Our employees are provided with appropriate safety equipment, and very little trouble is experienced in having this equipment used. Our employees are convinced that this material is for their protection and may save them from injuries which might incapacitate them.

An effective suggestion system is in operation, a part of which concerns suggestions for the removal of hazardous conditions and correction of unsafe practices. These suggestions are given careful consideration and, wherever possible, remedial measures are applied. The employee who makes an acceptable suggestion profits financially, and all employees are saved from possible injury through the removal of hazards and the introduction of safer methods of operation.

From time to time special studies are made of various types of accidents—such as electrical accidents, falls, eye injuries, foot injuries, and head injuries. These studies, distributed throughout our entire organization, have contributed a great deal to their reduction.

Routine inspections of our entire property, consisting of about 225 locations, are conducted at least twice a year for the purpose of detecting hazardous conditions which have developed since the preceding inspection. Special inspections are made when indicated.

New installations and changes in existing installations are discussed with the engineering department, and through these contacts many hazards are eliminated while projects are still in the design stage. These installations are followed in the field as the work progresses. We have enjoyed excellent relations with our engineering department, with the result that many costly

changes in the field have been eliminated.

First-aid instruction is another of our activities, and we are endeavoring to have as many of our employees as possible receive this instruction. There are many cases on record where employees have been able to render to fellow employees, and to the public, assistance without which the victim might have died. A very important part of our first-aid training is resuscitation by the prone-pressure method and the more recent pole-top method. It is interesting to note that 92 of our employees have received life-saving medals or certificates of assistance from national organizations.

Use Various Posters

Posters and bulletins concerning accident prevention are prepared to suit our local needs. These have been very effective. We also use posters furnished by the National Safety Council, insurance companies, and similar organizations. Material such as this posted on bulletin boards has much merit, but in our case, because of so many locations, it does not reach the entire personnel of the company; therefore, in certain instances it has been found necessary to make wider distribution of such material. While bulletin boards are important, we rely heavily upon personal contacts in matters concerning accident prevention.

As to contests, these are conducted on a yearly basis and not for short periods of time. We believe that spectacular campaigns or short no-lost-time-accident drives are not particularly valuable on a long-time basis, particularly in relation to the effort expended in such campaigns. We do believe, however, that keeping everlastingly at it day in and day out will keep accidents under control and bring about the desired results.

One of our outstanding activities is the Employee Lost-Time Accident Prevention Contest. There are seven divisions of this contest, divided into 35 sections, which are distributed in the seven divisions in order to make the competition between the sections as nearly equitable as possible. At the end of each calendar year the sections with the lowest frequency rates in their divisions receive plaques engraved with the name of the section and the name of the contest chairman. These plaques are retained by the sections only so long as they hold first place in their divisions. In 1942, each of the winning sections had a "No Lost-Time Accident" year.

Honor certificates are presented to all departments that have completed the year without a lost-time accident, and merit certificates are presented to departments that have reduced their accidents 25 per cent or more, as compared with the previous year.

Accident statistics covering the entire organization are published and distributed monthly to the supervisory personnel. Also, pertinent data are posted on all bulletin boards. In this manner, accident prevention is kept constantly before our employees. In these statistics we include a complete record of every department, whether or not the department has had a lost-time accident during the period covered. It is just as necessary to publish a department's perfect record as it is to publish its poor record. In these monthly statistics we include also the standing of each section of our employee contest, together with a description of lost-time accidents that occurred during the month.

In order to stimulate further interest in accident prevention, our company is entered in the following contests: National Safety Council, Pennsylvania Electric Association, Pennsylvania Department of Labor and Industry, and the Philadelphia Safety Council. All of these contests tend to focus attention upon accident prevention, and they create some interest as an aid in controlling accidents.

While we do not conduct contests in our automobile accident-prevention activities, the chairmen of our employee contest sections extend their efforts to the control of automobile accidents.

Each quarter we present safe driver cards to all eligible drivers, provided that they have successfully passed through the three-month period without an accident for which they were in any degree responsible. These cards show the length of time they have driven without a responsible accident. At the end of each year those who have completed 10 or more consecutive years without a responsible automobile accident are awarded the president's safe driver certificates. These are special certificates signed personally by the president of our company. On January 1st, this year, 215 drivers received this award for records ranging from 10 to 18 years. Had it not been for the curtailment of driving due to war conditions and to employees entering the armed services, this number might have been increased to nearly 300.

Lost-time accidents which call for complete investigation are brought to the attention of the head of the department involved, whereupon he arranges for a meeting of the interested parties. At that time all aspects of the case are reviewed in a thorough manner with the men concerned and with the witnesses to the accident. A report is prepared by the department head, who acts as chairman of the meeting, and the report is sent to the manager of the department. This statement brings out particularly the cause of the accident, responsibility for its occurrence, disciplinary action to be taken, and recommendations to avoid a recurrence. The psychological effect of these meetings cannot be overemphasized.

Automobile accidents are investigated by our claims department and, after carefully weighing all the considerations, the employee's department head is notified as to the employee's responsibility for the accident, and disciplinary action is suggested if the employee driver has been in any way negligent.

Accident Cases Reviewed

If the department head or the employee does not agree with this decision and has additional information to present, he is privileged to appeal the decision. The case is then placed before the manager of the claims department, the superintendent of transportation, and the safety director, who review the case and either sustain or revise the findings. If the department head or the employee is not satisfied, the case may be appealed to the vice-president in charge of his department for a final decision.

In conclusion, one point to be emphasized is that it is of decided advantage for a safety man to be associated with national, State, and local organizations in the accident-prevention field, and to attend conventions and conferences on this subject whenever possible. In this manner the safety man gets a broader viewpoint than would otherwise be obtained.

Also, I would like to emphasize the importance of selecting men with personality and tact to direct and deal with safety activities. The prevention of accidents is a sales job of the highest order, and while some results can be obtained by pressure, greater accomplishment can be achieved by proper contact with those with whom we deal.

Handling Break-Away Barrage Balloons

ALTHOUGH barrage balloons are fairly common in some parts of the country as parts of the war-time scene, it is possible that installations may appear from time to time in areas where they are an unfamiliar sight, and where methods for dealing with break-away balloons have not been developed in advance. The possibility of mischance is obvious in regions latticed with transmission lines but the actual record is quite erratic. There is a recorded case of a balloon traveling four hundred miles from its starting place and grounding without contact or damage to any electrical installations, but on another occasion when several balloons broke loose at the same time it is reported that five more or less serious transmission line interruptions occurred within three minutes.

Since many of the ill effects are likely to be associated with electric lines and there is generally a chance that the metallic parts of a fouled or grounded balloon may be charged due to contact while the envelope itself may contain a substantial quantity of gas, certain precautions are necessary for those civilians who may have occasion to participate in the salvaging of such balloons. It is also to be taken into account that these balloons are valuable government property so that the methods for salvaging, aside from the personal hazards involved, should be such that the balloon shall be recovered and rendered harmless without undue damage to it.

Through the kindness of Mr. J. T. O'Brien, Safety Director of the Jersey Central Power and Light Company, we are enabled to publish below the instructions of that company for dealing with break-away barrage balloons, as issued to its employees after review by the military authorities. While it appears to be probable that the military authorities will themselves issue general instructions in appropriate areas, it is thought that these highly detailed instructions to electric utility employees may provide a useful model to others concerned.

Safety Instructions to Employees for Handling Break-Away Barrage Ballons

In the event that a break-away barrage balloon is encountered, the following instructions relative to the handling of such break-away balloons are offered. If the procedure as outlined below is followed, it will operate to the best advantage of all concerned.

When a balloon breaks from its mooring, rupture of the cable is supposed to actuate a device that permits the inflammable gas to escape causing the balloon to descend. Under certain conditions this device fails to function and, even though the balloon descends, there will be some residual gas which could ignite or explode with unpredictable results.

If a barrage balloon is observed, or is observed grounded, keep away from it until it is definitely determined that no portion of the balloon or balloon cable is in contact with electrical wires. Keep all open flames, including smoking, at least 150 feet away.

Because of the definite FIRE HAZARD no fire or other source of ignition including smoking and/or sources of static electricity must be permitted within a distance of 150 feet from the stranded break-away barrage balloon.

Extreme caution is necessary in dealing with cable of stranded break-away barrage balloon, because *same may be resting on an electrical transmission line.*

Attach the handling ropes to any nearby object, keep fire and animals away, pending the arrival of a retriever crew from the Barrage Balloon Battalion.

In the event a break-away barrage balloon should become stranded within 150 feet of welding, burning, chipping, repair, loading, unloading, railroad or other operations, the balloon should be deflated and moved to a safe place before resumption of operations.

Deflation of balloon should be *undertaken by one person but only after* the following SAFETY AND FIRE PREVENTION MEASURES have been exercised:

(1) All equipment which is a potential source of ignition, unnecessary personnel and animals must be moved to a distance of not less than 200 feet UP WIND (a greater distance is suggested when forced to remain DOWN WIND) from the balloon.

NOTE: SMOKING must be absolutely forbidden within the above mentioned 200 feet UP WIND ZONE.

(2) The full length of the cable *must be examined by a competent electrician* FOR EVIDENCES OF A POSSIBLE CONTACT WITH AN ELECTRICAL TRANSMISSION LINE.

Should the cable be in contact with an electrical transmission line or even in proximity to one, necessary steps should be taken to render same harmless then:

The cable will be cut provided that such cutting *will not allow the balloon TO DRIFT AWAY.* If cutting the cable will allow balloon to escape, same should be cut only after deflation (which is covered by instruction No. 4 listed below) has been completed.

When cable is cut, it should be done as close to balloon proper as possible.

(3) Balloon should then be *deflated by one person.*

Person undertaking deflation should exercise the following *additional* safety precautions to eliminate or minimize effect of static electricity:

(a) Do not wear shoes with nails even slightly protruding. It is suggested that rubber overshoes or rubber soled shoes be worn.

(b) Do not wear woolen clothes, particularly during an extremely hot and dry period.

(4) DEFLATION is accomplished by pulling the "rip cord" which permits the gas to escape. "Rip cord" is of various lengths but is one-half inch (½") in diameter and painted red. It is the only red-colored cord on the balloon, and is directly connected to the gas release-opening termed "Rip Panel." (This rip panel is an integral part of the balloon and is situated across the top of the balloon approximately midway between the nose and tail. Its shape is that of a narrow rectangle, 10 feet long and 14½ inches wide, with a small taper at the end where ripping is initiated.) The rip cord itself is attached to the balloon proper by three sets of U-shaped spring clips and rings.

Normally each clip engages with a ring, and a force of 15 to 25 pounds is required to disengage it. The "rip cord" should be pulled steadily without jerking, to prevent damage to fabric, until all of the snatch rings have become disengaged.

No other opening should be made in the balloon before or after the "rip cord" is pulled. More than one opening may

result in the air mixing with the escaping gas to form an explosive mixture.

(5) The deflated balloon, which weighs approximately 1000 pounds, may then be moved by an expedient manner to a safe place (clear of traffic) BUT THE COMMENCEMENT OF THIS OPERATION SHOULD BE DELAYED FOR AT LEAST FIVE MINUTES AFTER THE DEFLATION HAS BEEN COMPLETED.

(6) Each barrage balloon normally has attached thereto four cloth shipping tags, listing thereon specific instructions for the finder. (These cloth shipping tags are individually attached at the nose and the tail and near the middle of either side of balloon.)

These instructions should be followed, but if none is found, all relevant data should be transmitted to the Safety Department.

In addition in event personnel observe a "break-away" balloon stranded off our property or in free-flight over right-of-way, it should be *reported to the load dispatcher at once, call South Amboy 800 giving him the exact location or drift if moving.*

Cost of Living Index Misleading as to Electricity—Situation to Be Remedied

THE last indexes of cost of living published by the U. S. Bureau of Labor Statistics, show that the total of the classification entitled "fuel, electricity and ice" stood at 107.6 of the 1935-39 average. Based upon prices of August, 1939, this group stands at 110.7. This has given the impression—and in fact has been headlined in some newspapers—that the price of electricity has risen during recent months. The facts are that the price of electricity has shown no rise at all, but the total of this group has been raised by higher prices of fuel and ice.

In June, 1943, the average price of 25 kwhr. of electricity in the 51 large cities which are used in making up the U. S. Bureau of Labor Statistics Cost of Living Index stood at 94.3 of the 1935-39 average and the price of 100 kwhr. 95.1. These figures compare with the published group total of 107.6.

In June, 1943, the average price of 25 kwhr. of electricity was 97.4 per cent of the August, 1939, average and the price of 100 kwhr. was 97.3 per cent, as compared with the figure of 110.7 published by many news services for the group total of "fuel, electricity and ice."

Up to the adoption of the first revision of the index of the Cost of Living in 1935, it was the usual practice to follow the main table of the index numbers for the country as a whole with another table showing the per cent of decrease in the price of electricity in 32 cities since 1913. This enabled the competent observer to form his own conclusions as to the responsibility for the rise in the main classification, then called "fuel and light." The new classification, now called "fuel, electricity and ice," while it draws attention to the present heavy weighting of electricity, is no longer followed by the separate table showing its price index, which now appears elsewhere among "Retail Prices." This situation will shortly be remedied by the U. S. Department of Labor. Mr. A. F. Hinrichs, Acting Commissioner of Labor Statistics, wrote the Edison Electric Institute recently as follows:

"We have frequently mentioned the stability of the direction of the utility rates series in our cost of living reports and did so in the latest report. Long-time series of indexes for retail prices of coal, gas and electricity, which have been published by the Bureau for many years, provide a better comparison of price trends for the component parts of the "fuel, electricity and ice" sub-group than for any of the other sub-groups, except food, which are included in the study of costs of living. . . .

We have long planned to prepare sub-indexes for a number of the component groups which are combined in our cost of living indexes as now presented, and only the shortage of clerical staff has prevented our carrying out this plan. An article will shortly appear in the *Monthly Labor Review* giving a number of these indexes.

. . . .

The *Monthly Labor Review* for July stated that, "In March, 1943, the U. S. Bureau of Labor Statistics revised its index of the cost of food to take account of current food shortages and food rationing. With this revision the Bureau continues its policy of making its cost-of-living index represent each month changes in the costs of the goods and services which wage earners and clerical workers can actually buy in the war years.

"In the last 19 months, the goods and services produced for civilians in the United States have undergone more drastic changes than occurred in the entire period from 1919 to 1935. The level of living of the people of the country rose sharply in 1941 and was lowered in 1942. However, changes in the plane of living are quite different from changes in the cost of living, and it is cost of living which the Bureau's index measures."

Sharp changes have been made in the components of the U. S. Bureau of Labor Statistics Cost of Living Index. With further rationing orders, all tires and tubes were dropped from the index by March, 1942. In May, 1942, in the area where gasoline was rationed, automobiles were dropped entirely and drastic cuts made in the weights for gasoline and motor oil. Washing machines, refrigerators and other household durables which had virtually disappeared from the market were removed from the housefurnishings index and many other smaller items were eliminated. The present relative importance of each group is as follows:

PERCENTAGE OF TOTAL COST OF LIVING

Item	*Old Series* (1935-39 *Avg.*)	*Present Base*
Food	35.4%	41.8%
Clothing	11.0	12.1
Rent	18.8	17.3
Fuel and ice	3.4	3.4
Electricity	1.7	1.3
Gas	1.6	1.3
Housefurnishings	4.4	3.1
Miscellaneous	23.7	19.7
	100%	100%

Pole Top Resuscitation

(*Continued from page* 300)

suscitation in which the pole top technique was recognized, by the Committee of Judges of the Prize Awards Committee, to be the method responsible, solely or in part, for the recovery.

The resuscitation technique itself as presented in the instructions on the accompanying pages is predicated on the work and experience of the Duquesne Light Company, and is a pre-print of the main text of the forthcoming manual. The general instructions and other details concerned with rescue procedure and practices are those which have come out of experience, but it is not intended to imply that they are necessarily superior to other safe and practicable measures which are in use by individual companies.

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Code for Electricity Meters (1941)	$1.60	$2.00
Good Radio Reception (1937)	100 copies	4.00
	1000 "	25.00
	3000 "	60.00
	5000 "	95.00
Objective Type Rates, 1933-1936	.80	2.00
Ice and Wind Loading Tables for Overhead Line Conductors (Revision of Tables 85 to 96 of the Overhead Systems Reference Book) 1942	1-4 copies	10c.
	5-49 "	6c.
Power Sales Manual (1941)	3.50	5.00
Rate Book for 1942	10.00	25.00
Rewiring for Commercial and Industrial Buildings (1941)	.25	.25
Sales Training Manual—Commercial Electric Cooking (1941)	1.50	1.50
Storm Loading and Strength of Wood Pole Lines and a Study of Wind Gusts (1936)	2.00	5.00

Periodicals

Better Light—Better Sight News (9 issues yearly)	$0.75	$0.75
Edison Electric Institute Bulletin (Monthly)	2.00	2.00
Rural Electrification Bulletin (5 issues yearly)	.60	1.00

Research on Graphitization of Piping

(*Continued from page* 308)

lished. If this is a straight temperature effect, the samples, at 1150 deg F, should graphitize at a greatly accelerated rate. Establishing a susceptible structure (spheroidization) may likewise speed up the process. Furthermore, the use of several temperatures will give a check on the similarity of the phenomena, and hence, justify the use of higher temperatures to study service behavior.

(1) Effect of C, Mn, Mo, and Cr, and the deoxidizing process in steel making. Most of the test samples will be procured from the power companies. In addition, a number of experimental heats of steel will be made, both according to pipe specifications and with small additions of various alloying elements, and deoxidized with different amounts of Si and Al. Billets will be converted into suitable shapes for testing.

(2) Effect of heat treatment. The effects of annealed, normalized, and overheated structures, and the effect of the structure produced by reheating to the critical temperature, will be studied.

(3) Effect of welding procedure. The steels of (1) and (2) will be welded under the following conditions:
   a. With different C-Mo and plain-carbon electrodes of the type commonly used in pipe assembly.
   b. With different preheat temperatures.
   c. With different stress-relieving temperatures.
   d. With flame-cut and machined bevels, having clean and dirty (oily or coal-powdered) surfaces.
   e. In flat, vertical, and horizontal positions. This may not be necessary.

(4) Effect of stresses. A few selected samples of welded and unwelded steels will be subjected to localized stress at the three temperatures. (Just how this will be done has not yet been determined. The selection of a method will depend somewhat upon the results of tests being run at G. E. in Schenectady and Public Service Electric and Gas (N. J.).

Note: Many of the specimens for the tests mentioned in (1)-(4) above, will be used for more than one test condition.

C. Heat Treatment to Redissolve Graphite.

Electrically operated and controlled furnaces (with automatically recorded temperatures) will be used to give the necessary testing temperatures. (These will run at 850 and 950 deg F to simulate actual operating conditions, and at higher temperatures, probably 1050 deg F and 1150 deg F to accelerate graphitization at two different rates.)

Segregated graphite may be caused by a combination of conditions which gives greatly accelerated graphitization in a single narrow zone. If so, it is thought that this will be developed by the program as outlined. If not, then an external source of carbon must be sought, a couple of which have been sugegsted for inclusion.

In conclusion, part of this program will consist of assembling data from other investigators and cooperating with them to secure as complete an understanding of the situation as possible.

EEI Publications

A catalog of all EEI publications is available upon request to

EDISON ELECTRIC INSTITUTE

420 Lexington Avenue, New York

PERSONALS

The Detroit Edison Company has elected two new Vice-Presidents, PAUL W. THOMPSON and ANGUS D. McLAY, and SAMUEL M. DEAN has been appointed Chief Engineer of the System. Mr. Thompson will have general responsibility for engineering and be in charge of power generation, central heating and the Company's Construction Bureau. Mr. McLay will have charge of the Sales Department and will continue as Sales Manager.

All three men have held executive positions with Detroit Edison for many years. Mr. Thompson has been Chief Engineer of Power Plants, and had active charge of the design of the Company's steam and electric generating stations. He came to the Company in 1914, having graduated from Cornell University in 1910. During the first World War, he served in Ordnance, rising from a first lieutenant to a major.

Mr. McLay came to the Company in 1914 as Superintendent of Eastern Michigan Edison at Ypsilanti. He came to the Detroit office of the Edison Company as a Sales Engineer in 1915 and has represented the Company in its dealings with large industrial power customers. In 1938, he became Sales Manager of the Company. Mr. McLay attended the University of Michigan, and was a major in the Signal Corps from 1917 to 1919.

The Company's newly appointed Chief Engineer, of the System, Mr. Dean, was born in Traverse City, Michigan, in 1891, and is a graduate electrical engineer from Michigan State College and from the General Electric Company's test course. Prior to his new appointment he was Chief Assistant Superintendent of Electrical System, which position he undertook in 1930, having come to Edison in 1925 as Senior Electrical Engineer. Mr. Dean will have charge of the planning and engineering of the Company's System.

MISS SARAH M. SHERIDAN, who has for many years had charge of the Company's Sales Department and directed its policies, will continue her duties as the Senior Vice-President of the Company, the announcement said.

G. W. SPAULDING, formerly superintendent of power at the Pennsylvania Water & Power Co., has been elected a vice-president of the company.

Mr. Spaulding has been with the company since 1924, having been its test engineer, assistant chief of tests, assistant to general superintendent in charge of power studies and system planning, assistant chief engineer, coordinating engineering studies and construction activities, and superintendent of power. He is a graduate of the Massachusetts Institute of Technology.

L. BYRON CHERRY, formerly associated with the law firm of Reid & Priest, New York, has been elected vice-president of the Jersey Central Power & Light Co. Mr. Cherry has been serving as a special counsel for the company since 1942, when he was retained by the board of directors in connection with matters pending before the Federal Power Commission and the State Board of Public Utility Commissioners. The appointment of HAROLD P. RICHMOND, formerly manager of the Dover district of the company, as general superintendent of operations for the company was also announced. In this capacity Mr. Richmond will have charge of all electric and gas operations.

W. W. PITTMAN of Dania, Fla., has been appointed local manager of the Georgia Power Co. at Arlington to succeed G. H. Flynt, resigned.

Consumers Power Co., Jackson, Mich., has announced several transfers following the resignation from the company of Lloyd A. Southard, electric distribution superintendent of the Muskegon division. GEORGE A. NEWSON has been named to succeed Mr. Southard in the Muskegon division. He had held the same position in the Manistee division for three and a half years. Mr. Newson joined the company in Kalamazoo in 1926, following graduation from the University of Michigan, and worked successively in Jackson, Alma and Muskegon before going to Manistee in 1940.

To succeed Mr. Newson as electric distribution superintendent of the Manistee division, W. GORDON HAGADORN has been transferred from the Cadillac division, where he held the same position. Mr. Hagadorn joined Consumers in 1927 and worked in Jackson and Saginaw before going to Cadillac for the company in 1930.

The new electric distribution superintendent of the Cadillac division is RAYMOND P. PAYNTER, transferred from the Alma division, where he was division engineer. A graduate of the University of Michigan, Mr. Paynter joined Consumers in Battle Creek in 1925. Successor to Mr. Paynter as division engineer of the Alma division is HENRY F. NIEDZIELSKI, formerly supervising engineer of the same division.

WILLIAM J. PIPER has been appointed assistant superintendent of meters of the Detroit Edison Co. Mr. Piper was employed by the company in 1923 as a technical engineer in the meter department.

OSCAR E. HAUSER has been appointed senior engineer of the meter department of the Detroit Edison Co. Mr. Hauser became identified with the company in 1908 as a meter inspector.

R. E. FIFE, tax agent, Southern California Edison Co., has been appointed executive assistant and E. R. PETERSON has been named to succeed him as tax agent. G. R. WOODMAN has been assigned to the position of acting superintendent of hydrogeneration. J. BRUCE has been appointed station chief at Long Beach steam station and J. J. McDADE assistant station chief.

HARRY M. OLDHAM, who has been assistant superintendent of the Rome division of the Georgia Power Co., has been promoted to division superintendent to fill the vacancy created by the resignation of Leland E. Anderson. Mr. Anderson has been made vice-president and general manager of the Columbus Transportation Co. Mr. Oldham joined the company in 1926, and had engineering experience in Athens, Atlanta and Macon before going to Rome in 1935 as assistant division superintendent. He will be succeeded as assistant division superintendent by J. C. LIFSEY, formerly Rome division meter superintendent. R. B. BALLARD of the Augusta meter department will be transferred to Rome as division meter superintendent.

DOROTHEA SHERLOCK has been appointed supervisor of home service for the Connecticut Light & Power Co., Waterbury, Conn. A member of the Waterbury general sales staff, she will

work with all districts, co-ordinating the company's home service program.

THOMAS W. WILSON has been elected to the newly created office of chairman of the board of the Delaware Power & Light Company.

STUART COOPER, a vice-president of that company and of the United Gas Improvement Company, was elected to succeed Mr. Wilson as president of Delaware Power & Light. Similar action was taken by the directors of the Delaware Coach Company and the Delaware Bus Company. The changes are effective as of Oct. 1.

The new board chairman, whose office will be at 600 Market Street, Wilmington, came to Wilmington in September, 1912, as vice-president and general manager of the Wilmington and Philadelphia Traction Company, predecessor of Delaware Power & Light. Before that he had served for 14 years with the International Railway Company of Buffalo, seven years as chief engineer and seven as general manager.

In October, 1927, Mr. Wilson was elected president of the Delaware Power and Light, the Delaware Coach Company, and the Delaware Bus Company. He has thus been an official of the company for 31 years.

Mr. Cooper, the new president of the Delaware Power & Light has been a vice-president of the United Gas Improvement Company since Nov. 15, 1929. He has also been a vice-president of Delaware Power & Light Company and Delaware Coach Company since Nov. 25, 1929, and has been actively associated with the operation and development of these companies. Prior to his association with these companies, he was for a period a vice-president of Philadelphia Electric Company; and earlier president of South Carolina Power Company, Charleston, S. C.

R. E. FORMAN, formerly chief designing engineer of the Pacific Power & Light Co., has been appointed superintendent of construction and maintenance to fill the vacancy caused by the death of C. S. Knowles. The appointment of A. E. BOND, formerly assistant distribution engineer, to Mr. Forman's former position was simultaneously announced. C. L. BROWN, formerly division engineer at Walla Walla, Wash., was at the same time transferred to Portland to take over Mr. Bond's former duties as assistant distribution engineer.

REX I. BROWN, president of the Southeastern Electric Exchange, has recently announced the appointment of the following chairmen to direct the sectional activities of the Exchange during the ensuing year:

Engineering and operation, P. J. CARLIN, Florida Power & Light Co.; sales, HUGH G. ISLEY, Carolina Power & Light Co.; accounting, R. E. HOWARD, JR., Alabama Power Co.; employee activities, T. NORMAN JONES, Virginia Electric & Power Co.

WALTER STOREY, formerly farm service consultant for the Puget Sound Power & Light Co., has been appointed manager of the Tacoma office, succeeding the late Kenneth B. Panchot. Mr. Storey is familiar with the Tacoma territory, having become associated with the Puget Sound utility's sales department in that city in 1900. He has worked in Kent, Puyallup and Sumner and has held a variety of positions which have given him an excellent background in the light and power business.

CONVENTIONS AND MEETINGS

OCTOBER

5-7	32nd National Safety Congress and Exposition of the National Safety Council, Sherman Hotel, Chicago, Ill.
6	Electric Water Heating Committee, EEI, 420 Lexington Ave., New York, N. Y.
7-8	Industrial Power and Heating Committee, EEI, 420 Lexington Ave., New York, N. Y.
8-9	Accident Prevention Committee, EEI, LaSalle Hotel, Chicago, Ill.
10-11	National Electrical Contractors Association, Hotel Drake, Chicago, Ill.
11-12	Electrical Equipment Committee, EEI, Hotel Cleveland, Cleveland, Ohio
11-12	Prime Movers Committee, EEI, Hotel Cleveland, Cleveland, Ohio.
11-12	Transmission and Distribution Committe, EEI, Hotel Cleveland, Cleveland, Ohio
11-13	American Gas Association, Jefferson Hotel, St. Louis, Mo.
14-15	Electrical Equipment Committee, Pennsylvania Electric Association, Benjamin Franklin Hotel, Philadelphia, Pa.
25-29	National Electrical Manufacturers Association, Waldorf-Astoria Hotel, New York, N. Y.

NOVEMBER

29-30-Dec. 1-3—The American Society of Mechanical Engineers, Pennsylvania Hotel, New York, N. Y.

DECEMBER

6-10	National Association of Manufacturers, Waldorf-Astoria Hotel, New York, N. Y.

JANUARY, 1944

25-26	Sales Executive Conference, Netherland Plaza Hotel, Cincinnati, O.

Meetings of EEI Engineering Committees in October

MEETINGS of several of the Engineering Committees of the Institute will be held in early October. The meetings scheduled as this issue goes to press are as follows:

The Accident Prevention Committee will meet at the La Salle Hotel, Chicago, Illinois, on Oct. 8 and 9, following the regular Fall Convention of the National Safety Council which will be held earlier in the same week, also in Chicago.

The Electrical Equipment Committee will meet at the Hotel Cleveland, in Cleveland, Ohio, on Oct. 11 and 12.

The Transmission and Distribution Committee will meet at the Hotel Cleveland, in Cleveland, Ohio, on Oct. 11 and 12.

The Prime Movers Committee will meet at the Hotel Cleveland, in Cleveland, Ohio, on Oct. 11 and 12.

Among the committees scheduled for simultaneous meetings in Cleveland, some joint sessions will be arranged on subjects of common interest to more than one committee.

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1943-1944

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Meter and Service, H. A. HOWERY, Kansas City Power & Light Co., Kansas City, Mo.

Prime Movers, E. R. CROFTS, Rochester Gas & Electric Corp., Rochester, N. Y.

Prize Awards, P. S. YOUNG, Public Service Electric & Gas Co., Newark, N. J.

Rate Research, F. A. NEWTON, The Commonwealth & Southern Corp., New York, N. Y.

General Commercial, EDWIN VENNARD, Middle West Service Co., Chicago, Ill.

Statistical, W. G. BOURNE, JR., The Commonwealth & Southern Corp., New York, N. Y.

Transmission and Distribution, FRANK SANFORD, The Cincinnati Gas & Electric Co., Cincinnati, Ohio.

Codes and Standards (a Subcommittee of the Operating Committee) H. B. BRYANS, Philadelphia Electric Co., Philadelphia, Pa.

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